NAVY

SAFETY AND OCCUPATIONAL HEALTH (SOH)

PROGRAM MANUAL

FOR FORCES AFLOAT

OPNAV INSTRUCTION 5100.19E
VOLUME I
SOH AND MAJOR HAZARD-SPECIFIC PROGRAMS

DEPARTMENT OF THE NAVY

OFFICE OF THE CHIEF OF NAVAL OPERATIONS

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IN REPLY REFER TO

OPNAVINST 5100.19E
N09F
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OPNAV INSTRUCTION 5100.19E, VOLUME I

From: Chief of Naval Operations

Subj: NAVY SAFETY AND OCCUPATIONAL HEALTH (SOH) PROGRAM MANUAL FOR FORCES AFLOAT

Ref: (a) OPNAVINST 5100.23G
(b) OPNAVINST 5100.8G
(c) SECNAVINST 5212.5D

Encl: (1) Navy Safety and Occupational Health Program Manual for Forces Afloat, Volume I

1. Purpose. To implement the Navy Safety and Occupational Health (SOH) Program and the requirements of reference (a) for afloat commands. This instruction has been administratively revised and should be reviewed in its entirety.

2. Cancellation. OPNAVINST 5100.19D, Volume I; OPNAV 5102-4, Motor Vehicle Mishap Report; OPNAV 5102-5, Diving Mishap (with or without hyperbaric treatment) Report; OPNAV 5102-6, Mishap Report; OPNAV 5102-7, Mishap Investigation Report; OPNAV 5102-7A, Mishap Investigation Report Endorsements (MIREs); OPNAV 5102-10, Off-duty, Recreation, Athletics, and Home Safety (RAHS) Mishap Report; DD-A&T (AR) 1020 (5102), Explosive Mishap or Conventional Ordnance Deficiency Report.

3. Discussion

a. References (a) and (b) provide policy and outline responsibilities for the implementation of the total Navy Safety and Occupational Health Program. The Navy program encompasses all safety disciplines such as aviation safety, weapons/explosives safety, off-duty safety, traffic safety, and occupational safety and health. This instruction covers the implementation of the SOH Program elements unique to an afloat environment. Injury and illness investigation, reporting and

recordkeeping requirements have been removed from chapter A6 of this instruction and now reside in 5102.1D, chapters 3 and 6.

b. This instruction updates the safety guidance and precautions contained in OPNAVINST 5100.19D. It reflects modifications to regulatory requirements and embodies lessons learned from mishaps. This document has been revised with significant input and coordination with representatives of the Fleet Commanders and Type Commanders staffs. Since this document modifies every chapter and most of the paragraphs from OPNAVINST 5100.19D, it does not identify modified, added, or deleted paragraphs.

c. Due to limitations on ship design and construction, paragraph B0611e was incorporated with the following implementation schedule for applicability and compliance. Beginning in fiscal year 2008, ships shall equip all new and/or upgraded fixed breathing air compressor systems with high-temperature cut-off switches. Beginning in fiscal year 2009, new and/or upgraded portable breathing air compressor systems will be equipped or operated with carbon monoxide monitor and alarm systems during SCBA air cylinder charging operations.

4. Action. All levels of command shall implement and manage the SOH Program in compliance with the policies, procedures, actions, and guidance set forth by this instruction. Reference (c) provides guidance on records disposition and shall be followed by shore and afloat commands. The policies, procedures, and actions prescribed here are published without the necessity for implementing instructions from the Echelon 2 commands, bureaus, and offices, except where specifically directed. However, commands having significant SOH responsibilities should provide appropriate supplemental guidance.

5. Forms and Reports

a. The following forms are available at Navy Forms On-line, https://forms.daps.dla.mil:

(1) OPNAV 3120/5, Safety Hazard Report, S/N 0107-LF-016-9300;

(2) OPNAV 4790/2K, Ship's Maintenance Action Form – 2 KILO, S/N 0107-LF-047-9011;

(3) OPNAV 5100/17, Heat Stress Monitoring Sheet;

(4) OPNAV 5100/18, Used Hazardous Material Identification Label, S/N 0107-LF-127-4700;

(5) OPNAV 6260/2, Caution – Asbestos Dust Hazard Sign, S/N 0107-LF-062-6010.

b. The following forms are available at the Department of Defense Forms Program, http://www.dtic.mil/whs/directives/infomgt/forms/formsprogram.htm:

(1) DD 771, JUL 1996, Eyewear Prescription;

(2) DD 2215, JAN 2000, Reference Audiogram;

(3) DD 2216, JAN 2000, Hearing Conservation Data;

(4) DD 2493-1, JAN 2000, Asbestos Exposure Part I, Initial Medical Questionnaire;

(5) DD 2493-2, JAN 2000, Asbestos Exposure Part II, Periodic Medical Questionnaire.

(6) DD 2521, OCT 2000, Hazardous Chemical Warning Label (8-1/2" x 11");

(7) DD 2522, OCT 2000, Hazardous Chemical Warning Label (4" x 6").

c. The following medical surveillance examination forms are available from the Navy Environmental Health Center, http://www-nehc.med.navy.mil/downloads/occmed/Medical matrix Feb 2001.pdf:

(1) #113, Asbestos Current Worker;

(2) #115, Asbestos Past Worker, 10+ Years Since First Exposure;

(3) #116, Asbestos Past Worker, 0 to 10 Years Since First Exposure;

(4) #161, Lead (Inorganic);

(5) #503, Noise;

(6) #512, Noise – Follow Up;

(7) #506, Radiation, Laser (Class III and IV);

(8) #505, Radiation, Ionizing;

(9) #716, Respirator User Certification Exam.

d. The following industrial hygiene forms are available from the Navy Environmental Health Center, http://www-nehc.med.navy.mil/ih/ihfom.htm:

(1) NEHC 5100/17 (July 2006), Industrial Hygiene Noise Survey Form;

(2) NEHC 5100/18 (July 2006), Industrial Hygiene Noise Dosimetry Survey Form;

(3) NEHC 5100/20 (August 2003), Heat Stress Afloat Form;

(4) CIHL 006 (May 2002), Asbestos Bulk Sample Analysis Form.

e. The laser and radio frequency radiation (RFR) exposure reporting requirements are exempted from reports control by SECNAVINST 5214.2B.

f. OSHA Form 174, Material Safety Data Sheet, is available from the Occupational Safety and Health Administration, Office of Publications, Room S1212, 200 Constitution Ave., N.W., Washington, D.C. 20210, or from the General Services Administration (GSA) Business Service Centers in Boston, New York, Philadelphia, Atlanta, Chicago, Kansas City, Fort Worth, Denver, San Francisco, Los Angeles, Seattle, and from GSA Specification Sales, Bldg. 197, Washington, D.C. 20407.

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Electronic only, Department of the Navy Issuances Website
http://doni.daps.dla.mil

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SUBMARINE SAFETY STANDARDS

CHAPTER A1

INTRODUCTION

A0101. BACKGROUND

a. The Navy has conducted safety and occupational health (SOH) programs for many years. These programs gained special prominence after passage of the Occupational Safety and Health Act (OSHAct) in 1970. The primary thrust of the OSHAct was directed at the private sector employer; however, section 19 of the OSHAct and several subsequent presidential executive orders directed federal agencies to establish and maintain occupational safety and health programs. Requirements for such programs are contained in Title 29 Code of Federal Regulations (CFR), Part 1960 (29 CFR 1960).

b. References A1-1 and A1-2 issued policy statements and outlined responsibilities for the implementation of the total safety and occupational health program for the Navy. The total safety and occupational health program includes all safety disciplines, such as system safety, aviation safety, weapons/explosives safety, traffic, recreational and off-duty and occupational safety and health.

c. Reference A1-3 is the Navy's SOH program manual and applies to both shore and afloat commands. Due to the many unique and specific situations associated with forces afloat, this manual was developed to be the primary SOH resource document for implementing the SOH Program for afloat commands.

d. Reference A1-4 provides policy and procedures for mishap investigation, reporting, and recording.

A0102. PURPOSE AND ORGANIZATION OF THIS MANUAL

a. The purpose of this manual is to provide commanding officers, safety officers, managers, supervisors, and workers for afloat commands with a document that gives the guidance and direction necessary to implement the SOH program.

b. This manual addresses all aspects of afloat SOH program management. In some instances, small ships (less than 300 personnel) may have to modify program management to suit their command. To ensure uniformity, group and squadron commanders may specify how small ships under their command are to implement the program management aspects of this manual (see paragraphs A0202(e) and A0202(f)).

c. This manual is organized into four sections.

(1) **Section A:** SOH Program Administration. This section outlines the overall administration, organizational, and training aspects of the SOH program, including a statement of policy and a listing of responsibilities.

(2) **Section B:** Major Hazard Specific Chapters. This section is divided into chapters which address specific hazards such as asbestos management, heat stress, hazardous material control and management, radiation protection, electrical safety, gas free engineering, tag-out and personal protective equipment. This section is addressed to personnel who have SOH management responsibilities and assist the commanding officer in implementing SOH requirements (e.g., safety officer, electrical safety officer, gas free engineer, hazardous material coordinator, and the medical department representative).

(3) **Section C:** Surface Ship Safety Standards. This section contains basic safety requirements that are applicable to surface ship activities and/or equipment. These precautions comprise the SOH safety standards for surface ships required by reference A1-1. It may be necessary, when conducting operations and maintenance on specific systems or equipment, to consult other Navy publications such as the Naval Ships Technical Manual (NSTM), naval warfare publications (NWPs), technical/operating manuals, and equipment maintenance requirement cards (MRCs) from the planned maintenance system (PMS) for additional safety precautions. This section is written for the individual deck-plate sailor and his/her supervisor.

(4) **Section D:** Submarine Safety Standards. This section contains basic safety requirements that are applicable to submarine activities and/or equipment. These precautions provide similar guidance to submarines as section C does for surface ships. These standards do not duplicate or supersede

the safety precautions found in either the standard submarine organization and regulations manual (SSORM), the ships systems manuals (SSMs), or the standard operating procedures (SOPs) applicable to submarines. These other standards augment section D precautions.

A0103. APPLICABILITY

a. The provisions of this manual apply to all Navy ship operations afloat including United States naval ships (USNS) of the Military Sealift Command (MSC) manned by federal civil service mariners and military personnel. Due to the manning complexities for MSC ships, there may be some administrative procedures in this manual that will need to be tailored for MSC ship applications. These procedures shall, at a minimum, provide protection equal to or better than that provided by this manual. Aviation squadrons and other embarked units that are required to comply with reference A1-3 ashore shall coordinate safety program requirements with the ship. The provisions also apply to Marine Corps personnel embarked in the aforementioned vessels. Information contained within volume I of this manual that specifically applies to submarines or that which exempts submarines is annotated as such. Shore activity service craft shall comply with the requirements of reference A1-3.

b. Requirements of this instruction are applicable to ship's forces while underway and during pier side evolutions. Other Navy instructions and requirements may have precedence during availabilities and when shore side personnel (military, Navy, civilian, or commercial) are on-board performing operations while pier side. Examples include energy control, gas free engineering, hazardous material, and fire watches. Afloat commands shall coordinate with appropriate personnel during pre-planning meetings for availabilities and pier side operations involving shore side personnel to ensure applicable Navy SOH instructions are identified and implemented.

c. Under the statutory authority of the Atomic Energy Act of 1954, as amended, and Executive Order 12344, codified in Public Law 98-525, the Director, Naval Nuclear Propulsion Program (CNO (NOON)), is responsible for the safety of reactors and associated naval nuclear propulsion plants, and the control of radiation and radioactivity associated with naval nuclear propulsion plant activities, including prescribing and enforcing

standards and regulations for these areas as they affect the environment and the safety and health of workers, operators, and the general public. Nothing in this manual shall affect the standards and requirements established by the Director, Naval Nuclear Propulsion Program (CNO NOON)), for areas under his cognizance. However, for areas other than those described above, such as asbestos control, heat-stress, electrical safety, and gas free engineering, the requirements of this manual apply to activities involved with naval nuclear propulsion.

d. This manual addresses the identification and maintenance of safe and healthful conditions in afloat work places or occupational environments. Recreational and off-duty safety and traffic safety program requirements are provided in references A1-5 and A1-6. Some, but not all, of aviation safety (chapters C7 and C12) and explosives safety (chapter C14) are addressed. Additional guidance in these areas is provided in references A1-7 through A1-10.

A0104. REFERENCES AND DEFINITION OF TERMS

For matters of convenience and organization, references for a specific chapter appear at the end of each chapter. Special terms and their definitions appear in the glossary at the end of volume I of the manual.

A0105. SOH MANUAL CHANGES

a. Users who identify a requirement for a modification to this manual shall initiate a change recommendation as follows:

(1) A proposed alteration to this manual or a safety requirement shall be submitted by the identifying command to Chief of Naval Operations (CNO), Special Assistant for Safety Matters (N09F), via the chain of command.

(2) A proposed alteration to a health standard/ criterion may be submitted by an individual or command to the Navy Environmental Health Center (NAVENVIRHLTHCEN) via the chain of command. NAVENVIRHLTHCEN shall submit the proposed modification to the Department of Navy, Bureau of Medicine and Surgery (BUMED), with a recommendation regarding incorporation of the modification into the manual.

b. Modifications to the manual shall be issued in the following manner:

(1) Alterations which are necessary for immediate incorporation into the manual and which cannot wait for the development of the next manual change shall be issued as advanced changes (A/Cs) by CNO (N09F). These changes may be issued by message or letter depending upon the requirement for manual entry timeliness.

(2) Periodically when a large number of modifications to the manual are necessary, a change to the manual shall be issued by CNO (N09F). These changes shall incorporate previously issued advanced changes.

(3) Changes to this manual shall be accomplished by page replacement.

A0106. TERMINOLOGY

The words shall, will, must, should, may, and can are used throughout this manual. Shall, will, and must are directive in nature and require mandatory compliance. Should is a strong recommendation, but compliance is not required. May or can, when used, are optional in nature and compliance is not required.

A0107. PRECEDENCE

In cases of conflicting safety standards among various directives and technical manuals, precedence shall be given to the directive issued by the highest authority and of the most recent issue date (i.e., Federal, DoD, SECNAV, OPNAV, Echelon 2, TYCOM, etc.). If a standard is not provided within any of those documents, then nationally recognized consensus standards, such as the American National Standards Institute (ANSI), American Conference of Governmental Industrial Hygienists (ACGIH), National Institute of Safety and Health (NIOSH) or other federally recognized national consensus standard may be cited.

CHAPTER A1

REFERENCES

A1-1. SECNAVINST 5100.10J

A1-2. OPNAVINST 5100.8G

A1-3. OPNAVINST 5100.23G

A1-4. OPNAVINST 5102.1D/MCO P5102.1B

A1-5. OPNAVINST 5100.25A

A1-6. OPNAVINST 5100.12G

A1-7. OPNAVINST 3750.6R

A1-8. Naval Warfare Publication/Fleet Marine Force Manual, NWP 3-04.1M/FMFM 5-34, Shipboard Helicopter Operating Procedures

A1-9. Naval Warfare Publication, NWP 3-50.1, Navy Search and Rescue Manual

A1-10. Naval Sea Systems Command, NAVSEA OP-4, Ammunition and Explosives

CHAPTER A2

SOH PROGRAM ORGANIZATION AND RESPONSIBILITIES

A0201. POLICY

Navy policy is to maintain safe and healthy working conditions for personnel and enhance operational readiness and mission accomplishments by establishing an aggressive safety and occupational health (SOH) program that will reduce occupational injuries, illnesses or deaths, and material loss or damage. The safety aspects of the program address the elimination or control of hazards that can result in immediate injury or death. The occupational health aspects are primarily concerned with the identification, elimination, or control of hazardous chemical, physical, and biological agents with potentially adverse health effects. Also included is the diagnosis and treatment of work related illnesses and injuries.

A successful Navy SOH program that reduces work-related injuries and illnesses results when the program is emphasized at every level of the organization. The Navy is in accordance with this principle, and the overall responsibility for the SOH program is vested in the Secretary of the Navy and implemented through the chain of command. The maintenance of safe and healthful working conditions is a responsibility of the chain of command.

A0202. OVERALL NAVY PROGRAM

a. The Assistant Secretary of the Navy (Installations and Environment) is the designated SOH official for the Department of the Navy.

b. Chief of Naval Operations (CNO) is responsible for implementation and management of the SOH program and, in coordination with the Commandant of the Marine Corps, for matters of mutual concern. The CNO shall:

(1) Issue appropriate SOH policy and standards. Chief of Naval Operations, Special Assistant for Safety Matters (N09F), is responsible for developing program policy and guidance and issuing standards under references A2-1 through A2-6.

(2) Ensure that fleet commanders maintain a staff of qualified SOH professionals who shall be responsible for maintaining a comprehensive SOH program. This includes providing guidance, direction, and policy for SOH matters throughout the fleet.

(3) Establish appropriate planning, programming, staffing requirements, and budgeting for the SOH program and training.

(4) Conduct research and development to preclude occupational hazards or exposures from causing physical injury or degrading health status or work performance.

(5) Develop SOH program evaluations/inspection criteria.

(6) Provide for occupationally-related medical support.

(7) Develop procedures for prompt investigation of reports of unsafe or unhealthful working conditions and ensures corrective action is taken within appropriate time periods.

(8) Ensure personnel receive thorough and continuing training on SOH matters and risk management.

(9) Adopt, develop, and review proposed alternate standards and promulgate SOH standards.

c. Commander, U.S. Fleet Forces (CFFC) Command; Commander, U.S. Pacific Fleet (COMPACFLT); Commander, Military Sealift Command (COMSC); and Commander, Special Warfare Command (COMSPECWARCOM). As safety is an inherent responsibility of command, CFFC, COMPACFLT, COMSC, and COMSPECWARCOM shall maintain a staff of qualified SOH professionals who shall be responsible for maintaining a comprehensive SOH program. This includes providing policy, direction, guidance, and oversight for SOH matters throughout the fleet and ensuring that subordinate commanders, commanding officers, and officers in charge:

(1) Conduct and maintain an aggressive and comprehensive SOH program.

(2) Assign SOH responsibilities to qualified personnel as a primary duty billet.

(3) Set SOH performance targets and measures, with concurrence of the type commanders, for comparison by ship class and operational cycle and provide them to the Board of Inspection and Survey (INSURV). These targets and the measures shall be reviewed on an annual basis.

(4) Coordinate with Commander, Navy Installations Command (CNIC), systems commands, Commander, Naval Safety Center, and regional and shore host activity commanders regarding support services for traffic, recreational and off-duty, home, hazardous materials/waste, and other aspects of SOH provided to local afloat units.

(5) Ensure timely, thorough safety investigations are conducted in accordance with reference A2-7.

d. Type Commanders (TYCOMs). Oversight of subordinate commands' SOH programs and coordination of matters of mutual concern are the primary responsibilities of TYCOMs. Accordingly, TYCOMs shall:

(1) Ensure that subordinate commands implement the SOH afloat program. Program oversight shall be in accordance with reference A2-1.

(2) Assign TYCOM SOH responsibilities to qualified personnel as a primary duty billet. If the TYCOM safety officer has not previously attended this course, ensure newly assigned TYCOM safety officer(s) attends the Afloat Safety Officer course (A-4J-0020) or Submarine Safety Officer course (F-4J-0020), as appropriate, prior to or within six months of assignment.

(3) Provide SOH assist visits, upon request.

(4) Coordinate and promote those aspects of the SOH program of mutual concern to forces afloat.

(5) Coordinate industrial hygiene support and minimally retain cover letter(s), executive summaries or electronic versions of industrial hygiene surveys for units under their cognizance.

(6) Ensure timely, thorough safety investigations are conducted in accordance with reference A2-7.

e. Immediate Superiors in Command (ISICs) shall:

(1) Assign SOH responsibilities to qualified personnel. Ensure that the ISIC safety officer attends the Afloat Safety Officer Course (A-4J-0020) or Submarine Safety Officer Course (F-4J-0020), as appropriate, prior to or within six months of assignment.

(2) Assist afloat commands to ensure that afloat workplace SOH discrepancies beyond shipboard capability are identified and prioritized in the workload availability package.

(3) Ensure timely, thorough safety investigations are conducted in accordance with reference A2-7.

(4) Ensure afloat commands complete required safety surveys and baseline and periodic industrial hygiene surveys.

(5) Ensure SOH program oversight inspections of subordinate commands are conducted at a minimum of once every three years, to include reviews of the traffic safety program (reference A2-6), the recreational/off-duty safety program (reference A2-7) and operational risk management implementation (reference A2-8) are performed. INSURV safety and occupational health inspections and Naval Safety Center afloat safety surveys will meet this requirement provided that copies of the results are provided to the ISIC by the unit commanding officer. The unit commanding officer must provide a copy of the report and written status to the ISIC of all discrepancies identified during the survey within 30 days of receipt of the report. The report should indicate those discrepancies that have been corrected, those on the consolidated ship maintenance project (CSMP) (including job sequence number (JSN)), and those beyond capability of the command to correct without outside assistance. Program implementation reviews should utilize the checklists provided in this instruction and the Naval Safety Center website at: http://www.safetycenter.navy.mil/afloat/checklists.

f. Specified Support Areas. Specified support areas are concerned with those aspects of the SOH program requiring special attention or technical expertise. The Commander, Naval Sea Systems Command; Commander, Naval Air Systems Command; Chief, Bureau of Medicine and Surgery; Naval Safety Center; and the Chief, Naval Education and Training, in coordination with or at the

direction of respective primary program sponsors, develop procedures, SOH standards, and instructions for the specified support areas. The designated officials will carry out these responsibilities as follows:

(1) **Commander, Naval Sea Systems Command (COMNAVSEASYSCOM), and Commander, Naval Air Systems Command (COMNAVAIRSYSCOM)**, ensure that:

(a) SOH aspects are considered in the design and engineering of all ships and aircraft, weapons or weapon systems, equipment, materials, supplies, and facilities which are acquired, constructed, or provided through COMNAVSEASYSCOM/COMNAVAIRSYSCOM.

(b) Engineering control of significant occupational health problems, such as noise, asbestos, and hazardous materials, is emphasized.

(2) **Bureau of Medicine and Surgery** (BUMED). BUMED provides support in all aspects of occupational health, including occupational medicine, industrial hygiene, and environmental health. BUMED, through the Navy Environmental Health Center (NAVENVIRHLTHCEN), shall ensure appropriate audit control and overall centralized management of the Consolidated Industrial Hygiene Laboratories (CIHLs). Navy environmental and preventive medicine units and naval medical treatment facilities provide assistance to afloat commands in the occupational health aspects of the SOH program.

(3) **Commander, Naval Safety Center** (COMNAVSAFECEN). COMNAVSAFECEN, in addition to serving as CNO (N09F), Special Assistant for Safety Matters, collects and analyzes mishap data and disseminates lessons learned and other safety information. COMNAVSAFECEN provides direct support and assistance to fleet units in safety matters upon request. COMNAVSAFECEN sponsors and coordinates the CNO safety awards, conducts safety surveys, and assists as requested with safety investigations conducted in accordance with reference A2-7.

(4) **Naval Education and Training Command** (NETC) and **Navy Occupational Safety and Health and Environmental Training Center** (NAVOSHENVTRACEN) ensure that all elements of the SOH Navy Training Systems Plan, NTSP S-40-8630D, for afloat units are properly executed.

(5) **President, Board of Inspection and Survey** (PRESINSURV) conducts SOH oversight inspections/assessments for forces afloat as part of the regular INSURV inspection process.

A0203. COMMAND PROGRAM

a. Ships or other afloat units can only achieve a safe and healthful working environment through the full participation and cooperation of all personnel assigned. Establishing and implementing a comprehensive SOH program is achieved through the ship's chain of command.

b. Commanding Officers. The commanding officers of ships and other afloat units shall:

(1) Implement and maintain a continuing SOH program per this instruction.

(2) Designate a command primary duty or collateral duty safety officer. Ensure that the command safety officer is provided with SOH management training in accordance with chapter A5 of this instruction.

(3) Ensure the command has received a baseline industrial hygiene survey and has a copy of the survey report on-board. Any additional industrial hygiene information received after the baseline survey, such as the periodic IH survey, or follow-on reports shall be appended to the baseline survey.

(4) Coordinate occupational health support with the cognizant BUMED activity.

(5) Incorporate required SOH training into the command's training program.

(6) Ensure timely, thorough safety investigations are conducted in accordance with reference A2-7.

(7) Serve as the chair of the Safety Council.

(8) Designate a command web-enabled safety system (WESS) safety authority so that access to unit data may be retrieved.

(9) Ensure that an INSURV safety and occupational health inspection or Naval Safety Center afloat safety survey is conducted at a minimum of every three years. A copy of the inspection/survey results will be provided to the ISIC by the unit commanding officer within 30 days of receipt of inspection/survey report along with written status report of all discrepancies identified during the inspection/survey visit. The status report should indicate those discrepancies that have been corrected, those on the consolidated ship maintenance (CSMP) (including job sequence number (JSN)), and those beyond capability of the command to correct without outside assistance.

c. Safety Officer/Collateral Duty Safety Officer. The safety officer is responsible for managing the SOH program. The safety officer reports directly to the commanding officer on SOH matters and to the executive officer for the administration of the SOH program. Primary duty safety officers shall be assigned to CV, CVN, LHA, LHD, AS, type ships. Ship and submarine squadrons and groups shall appoint a commissioned officer as the safety officer. On ships without a primary duty safety officer, the commanding officer shall appoint a commissioned officer of department head status and seniority as collateral duty safety officer (hereafter referred to as the safety officer). TYCOMs may grant waivers for small ships with limited officer manning to appoint a chief petty officer as the safety officer. The safety officer shall:

(1) Act as the principal advisor to the commanding officer on shipboard SOH matters.

(2) Oversee ship-wide planning to implement all elements of the SOH program.

(3) Prepare and submit, through the chain of command, requests for external SOH support such as industrial hygiene surveys, safety surveys, safety assist visits or technical guidance.

(4) Participate in mishap and safety investigations, as appropriate, per reference A2-7.

(5) Ensure timely and accurate recording and reporting of required mishap reports, per reference A2-7.

(6) Maintain and analyze SOH records (inspection/assessment reports, injury reports, and mishap statistics) and determine trends.

(7) Ensure that an annual internal safety inspection is performed.

(8) Ensure dissemination of SOH information.

(9) Schedule/coordinate required SOH training with the training officer/planning board for training. Conduct training as appropriate and ensure records of that training are maintained.

(10) Serve as advisor-recorder of the safety council. Prepare agenda for issuance by the chairperson.

(11) Serve as chairperson of the enlisted safety committee.

(12) Ensure, that SOH discrepancies beyond ship's force capability are properly identified, prioritized, and documented for corrective action.

(13) Complete the Afloat Safety Officer course (A-4J-0020) or the Submarine Safety Officer course (F-4J-0020), as appropriate, prior to or within six months of assignment.

NOTE:

On ships where an industrial hygiene officer (IHO) is the assistant safety officer, the IHO shall complete the Afloat Safety Officer Course (A-4J-0020) prior to or within six months of assignment.

On ships where the safety officer has attended and successfully completed the department head course at Surface Warfare Officer School Command, completion of the Afloat Safety Officer Course is not required as the Department Head Course contains the A-4J-0020 curriculum and is considered its equivalent.

(14) Ensure timely processing and follow-up on safety hazard reports submitted by crew members.

(15) Coordinate with the command's traffic safety coordinator and recreation and off-duty safety (RODS) coordinator to include these programs in the overall SOH program.

(16) On ships where the assigned safety officer or assistant safety officer is an industrial hygiene officer (IHO):

(a) Maintain and ensure calibration of all industrial hygiene equipment.

(b) Participate in and demonstrate proficiency in asbestos laboratory quality assurance programs as required by the TYCOM.

(c) Ensure that exposure monitoring for the command is performed, and provide technical assistance on request to tended units and other afloat units.

(17) Establish web-enabled safety system (WESS) account on COMNAVSAFECEN website.

d. Ship's Medical Officer/Medical Department Representative. In support of the SOH Program, the ship's medical officer/medical department representative shall:

(1) Participate in the SOH program (e.g., assist division officers/work-center supervisors by providing occupational health information).

(2) Coordinate external occupational medicine support as necessary.

(3) Initiate injury reports on personnel treated by the medical department to the commanding officer via the chain of command with a copy to the safety officer for investigation (and a copy to the officer of the deck for entry into the deck log).

(4) Maintain a hard copy or electronic log of work-related injuries and illnesses for military personnel, according to reference A2-7, with separate logs for on-duty and off-duty personnel, and a separate log for any assigned civilian personnel.

(5) Maintain medical surveillance records and coordinate screening exams as advised in the baseline or periodic industrial hygiene surveys.

e. Department Heads, Division Officers, and Work-Center Supervisors shall:

(1) Ensure that all assigned workspaces are inspected and maintained free of hazards and are in compliance with applicable SOH standards.

(2) Ensure that all assigned personnel are properly trained, advised of any associated hazards, are equipped/provided with appropriate protective clothing/equipment, and complete any required medical surveillance screenings.

(3) Take prompt action to abate/correct any identified deficiency under their control.

(4) Integrate safety in all activities consistent with mission requirements.

(5) Ensure that mishaps, hazards, and near-mishaps are reported to the safety officer.

(6) Division officers shall appoint a senior petty officer (E-5 or above) as the division safety petty officer to assist in the responsibilities outlined above and provide appropriate on board indoctrination to ensure satisfactory performance in the safety field.

Note:

For submarines. Division safety petty officers are not required aboard submarines.

f. Master-at-Arms (MAA) (not applicable to submarines). MAA personnel shall, during routine inspections, identify and report physical hazards that could result in injury to personnel or damage to equipment, and enforce the use of safety devices and protective equipment.

g. Division Safety Petty Officers/Aviation Safety Petty Officers (not applicable to submarines). The division safety petty

officer or aviation safety petty officer (when embarked onboard ship) shall:

(1) Inspect division spaces and submit hazard reports per OPNAV 3120/5, chapter A3.

(2) Advise the division officer on the status of the SOH program within the division including any safety-related items revealed through maintenance, such as non-compliance with or deficiency in the planned maintenance system(PMS).

(3) Keep the division officer informed of safety training needs within the division.

(4) Conduct division SOH training and ensure documentation of that training is maintained.

(5) Assist in mishap or hazard investigations and provide recommendations to division officers for correction.

(6) Serve on the enlisted safety committee.

(7) Perform or supervise the performance of required safety petty officer maintenance index page (MIP) planned maintenance.

h. Safety Council. The safety council consists of the commanding officer (chairperson), safety officer (recorder), training officer, all department heads, medical officer/representative, a safety representative from each embarked unit (e.g., air wing safety officer, Marine expeditionary unit (MEU) safety officer, explosive ordnance disposal (EOD) detachment), and the ship's command master or senior chief petty officer. The safety council shall meet at least quarterly and develop agendas and action items based on the afloat unit’s scope of operations and hazard or mishap experiences. Safety council meetings may be held in conjunction with other meetings of similar attendance. Minutes of each meeting shall be recorded (electronic or hard copy) and retained by the safety officer, with proof that the commanding officer has reviewed and approved the minutes (initials, signature, or electronic record). Specifically, the safety council:

(1) Reviews statistics compiled by the safety officer from mishap, hazard and inspection reports, safety or health

related messages, and related reports from the medical representative.

(2) Establishes mishap prevention goals and plans.

(3) Establishes program improvement plans based on mishap experience, program deficiencies and other information.

(4) Reviews issues and recommendations submitted by the enlisted safety committee.

(5) Review compliance with operational risk management (ORM) implementation in all applicable operations and evolutions.

i. Enlisted Safety Committee (not applicable to submarines). The enlisted safety committee consists of the safety officer (senior member), division safety petty officers, a safety representative from each embarked unit (e.g., aviation safety petty officer or Marine safety specialist), and the chief master-at-arms. If desired, the enlisted safety committee may be incorporated into the safety council. The committee meets at least quarterly, and the safety officer shall retain minutes of each meeting (electronic or hard copy). The safety officer shall appoint a recorder. The purpose of the committee is to:

(1) Identify and discuss SOH problems.

(2) Discuss interdepartmental safety issues.

(3) Submit issues and recommendations in writing to the safety council by copy of the safety committee minutes.

j. All hands shall:

(1) Comply with all safety precautions/standards and use required personal protective equipment.

(2) Promptly report suspected unsafe or unhealthful work procedures or conditions to their immediate supervisor, the division safety petty officer, or the safety officer.

(3) Report injuries, occupational illnesses, or property damage resulting from a mishap immediately to their supervisor.

CHAPTER A2

REFERENCES

A2-1. SECNAVINST 5100.10J

A2-2. DoD Instruction 6055.1, DoD Safety and Occupational Health (SOH) Program

A2-3. OPNAVINST 3500.39B, Operational Risk Management

A2-4. DoD Instruction 6055.5, Industrial Hygiene and Occupational Health, of

A2-5. OPNAVINST 5100.12G

A2-6. OPNAVINST 5100.25A

A2-7. OPNAVINST 5102.1D/MCO P5102.1B

CHAPTER A3

INSPECTIONS, SURVEYS, ASSISTS, HAZARD REPORTING AND MEDICAL SURVEILLANCE

A0301. DISCUSSION

a. This chapter addresses hazard identification and detecting adverse health effects. The principle way to identify hazards is through workplace inspections. Workplace inspections involve chain of command observation of operations at the job site on a routine basis to identify potential hazards. Workplace inspections also involve evaluations of ship's spaces and equipment by appropriate occupational safety and health personnel. Industrial hygiene surveys are another essential tool for identifying workplace hazards, characterizing risk and developing appropriate controls to reduce hazards.

b. Hazard identification, risk assessment, and hazard management and control are key steps in the Navy operational risk management (ORM) process outlined in reference A3-1. Navy personnel at all levels are required to use ORM as a decision-making tool by anticipating and assessing hazards (risk) and reducing the potential for mishap.

A0302. WORKPLACE INSPECTIONS

Routine inspection of all workspaces to identify hazardous conditions and/or unsafe work practices is a basic requirement of the SOH program. Such jobsite work observation is intended to identify and correct hazards. Hazards may be a result of many things, including unsafe work practices, violations of standards of sections C or D of this manual, not posting warning or equipment placards, or not following planned maintenance system (PMS) procedures. Identification of hazard trends may warrant a ship-wide safety inspection as part of a safety stand-down (chapter A5) to raise the command's safety awareness.

a. Safety Inspections. The safety officer shall ensure that all workspaces are inspected at least annually, for safety. They shall inspect high hazard areas more frequently based upon an assessment of the potential for injuries, occupational illness or damage to Navy property. An experienced officer or

chief petty officer, accompanied by a division safety petty officer (for submarines, a submarine qualified senior petty officer from the division), shall be assigned to accomplish the safety inspection of a workplace. It is not necessary to conduct safety inspections of all work spaces/equipment at one time. "Safety" shall be reviewed at all regularly scheduled zone or 'division in the spotlight' inspections required by reference A3-2. These zone inspections will include all aspects of the safety inspection. A copy of the completed deficiency list, such as a zone inspection deficiency list (ZIDL), shall be provided to the safety officer upon completion of the inspection. The safety officer shall retain the inspection results for at least two years, and review and track corrective actions on safety and industrial hygiene deficiencies as specified in paragraph A0404.

b. Master-at-Arms Force Inspections (not applicable to submarines). The master-at-arms (MAA) force shall act as roving safety inspectors during their normal tours of the command. They shall be alert to any deficiencies or hazards which could result in injury to personnel or damage to equipment. The MAA force shall assist the safety officer in keeping the SOH program visible to all hands and enforcing safety. The MAA force shall attempt to have any observed deficiency or hazard, or failure to use safety devices and protective equipment, corrected "on the spot." If this is not possible, the ship's force MAA will report the deficiency on a safety hazard report (OPNAV 3120/5) available on-line at https://forms.daps.dla.mil.

c. Oversight Inspections. SOH and environmental protection (EP) inspections are conducted by the Board of Inspection and Survey (INSURV) during final contract trials (FCTs) and regularly scheduled (4-5 years) material inspections (MI). In addition to the SOH elements of this instruction, additional items inspected during these MIs or FCTs are identified in the traffic safety program, reference A3-3, recreation/off-duty safety program, reference A3-4, and in the INSURV inspection instructions, references A3-5 or A3-6. Copies of all SOH-related discrepancy results from these inspections shall be routed to the safety officer to ensure that identified safety hazards are documented, and tracked to correction. Checklists are available at: http://www.spawar.navy.mil/fleet/insurv.

A0303. SELF ASSESSMENTS

Self-assessments of all safety programs applicable to the afloat unit will be conducted at least annually as part of the annual workplace safety inspection. These may be conducted as a single project or staggered throughout the year. Copies of the self-assessment results, hard copy or electronic, will be retained by the safety officer for at least two years. The safety officer will advise the safety council and safety committee, as applicable, of the results of these self-assessments and status of any corrective actions. Checklists are available at http://www.safetycenter.navy.mil/afloat/checklists, at the end of each applicable topic chapter, or developed and customized by the afloat unit, as a self-assessment tool.

A0304. INDUSTRIAL HYGIENE SURVEYS

a. Navy industrial hygiene personnel anticipate, recognize, evaluate, and make recommendations to control unacceptable workplace exposures. Exposure assessment of Navy workplaces requires a sound, logical strategy and shall be based on references A3-7 and A3-8. The purpose of such a strategy is to accomplish at least four goals:

(1) To assess potential health risks faced by Navy personnel by understanding their exposures, to differentiate between acceptable and unacceptable exposures, and to control unacceptable exposures.

(2) To establish and document a historical record of exposure levels for Navy personnel and to communicate exposure monitoring results.

(3) To ensure and demonstrate compliance with safety and health exposure criteria.

(4) To provide a base for medical surveillance examinations.

b. The occupational exposure assessment strategy is the plan for recognizing, evaluating, and documenting all exposures, and for developing controls for occupational exposures that are judged unacceptable. There are five major steps in setting up a functioning occupational exposure assessment program:

(1) Basic characterization;

(2) Exposure assessment;

(3) Further information gathering;

(4) Communications and documentation;

(5) Reassessment.

c. Chief, Bureau of Medicine and Surgery (BUMED), shall provide all afloat activities with a current, thorough occupational exposure assessment of each workplace according to reference A3-7. BUMED activities shall routinely update the exposure assessment. The following subparagraphs outline the basic requirements for occupational exposure assessment.

(1) **Basic Characterization of the Workplace (Walk-through Survey).** The first step in the Navy's exposure assessment strategy is to characterize the workplace, workforce and environmental agents. The cognizant industrial hygienist (IH) shall conduct a survey of each workplace to obtain, as a minimum, the following information:

(a) Descriptions of operations, tasks and work practices that take place in the workplace (e.g., welding, spray painting). The description shall include a layout sketch incorporating relevant aspects of the factors listed below, along with the number of persons assigned to the operation/task and the specific work area(s) occupied. The IH shall note the frequency and duration of events taking place within the workplace.

(b) A list of hazardous materials (HM) used in the workplace that present significant risk. The list shall include a description of use at each workplace. Reproductive hazards and carcinogens shall be specifically identified.

NOTE:

IHs shall have access to a copy of the authorized use list for the workplaces being surveyed.

(c) A list of physical hazards (e.g., noise, ergonomic stressors, non-ionizing radiation) in the workplace that present significant risk including a brief description of their source(s).

(d) A description of existing controls (e.g., industrial ventilation and personal protective equipment).

(2) **Exposure assessment**. The BUMED IH will assess exposures using all the information available. The outcomes include: groupings of workers having similar exposures, definition of an exposure profile for each similarly exposed group and judgments about the acceptability of each exposure profile. The BUMED IH shall make appropriate control strategy recommendations regarding the workplace, workforce, and environmental agents based on the results of the exposure assessments by using accepted industrial hygiene practices, which comply with appropriate regulatory requirements.

(3) **Further information gathering**. Exposure profiles that are not well understood, or for which acceptability judgments cannot be made with high confidence must be further characterized by collecting additional information. Information needs may be quantitative or qualitative depending on the exposure profile and judgment.

(4) **Quantitative Exposure Monitoring**. Monitoring the workplace for toxic substances and/or harmful physical agents is the primary means of assessing:

(a) Personnel exposures.

(b) The need to control exposures.

(c) The effectiveness of measures directed at reducing or eliminating health hazards.

An IH shall accomplish these assessments using data gathered from representative sampling programs in the workplace. Analysis and interpretation of the data from this sampling assists in the timely assessment of hazards, in making recommendations for changes to existing conditions, and in determining requirements for the medical surveillance of exposed personnel.

(5) **Qualitative Exposure Decisions**. Examples may include exposure modeling, biological monitoring or determining an appropriate occupational exposure level. The IH shall determine the appropriate information needed, gather it, and evaluate it so that an acceptable or unacceptable exposure assessment is reached and appropriate controls and recommendations can be implemented.

(6) **Communications and Documentation**. Exposure assessment reports and records are critical elements of the exposure assessment process. Reports and records are needed to ensure effective communication of workplace findings and successful continuity of the industrial hygiene program.

d. Baseline Industrial Hygiene Surveys. Each ship and submarine shall arrange for a baseline industrial hygiene survey. This survey may be scheduled and obtained through the supporting Navy Environmental and Preventive Medicine Unit (NAVENPVNTMEDU) or Bureau of Medicine and Surgery (BUMED) medical treatment facility (MTF). The survey will consist of the following elements:

(1) A detailed hazard evaluation of all operations which present a potential for exposure to hazardous chemicals and/or harmful ergonomic, physical (e.g., noise, heat stress) or biological agents.

(2) When sampling is warranted to quantitatively characterize workplace exposures, collect samples per reference A3-8. Navy occupational exposure limits (OELs) and Federal Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs) will be determined using chapter 16 of reference A3-7. Reference A3-9 provides requirements for submarine atmosphere sampling and guidance for submarine unique PELSs. The survey shall include a list of exposures that require routine monitoring (e.g., exposure monitoring plan).

(3) An assessment of the effectiveness of general and local exhaust ventilation systems used for the control of contaminants, flammable storerooms, and hazardous material storerooms. Ventilation systems require routine evaluation and shall be included in the exposure monitoring plan.

(4) Findings (e.g., ventilation system deficiencies) which can be used as additional justification for inclusion of material issues on the ships consolidated ship maintenance project (CSMP).

(5) Recommendations for personal protective equipment, respiratory protection, emergency equipment (eyewash stations and deluge showers), posting of hazards, and actions on specific survey results (noise, air sampling, etc.), including:

(a) A list of noise hazardous areas/equipment

(b) A list of eye hazardous areas/processes and recommended emergency eyewash and deluge shower locations

(c) A list of each area/process requiring respiratory protection and the recommended type(s)

(6) Medical surveillance requirements.

e. An update of the baseline industrial hygiene survey is necessary as system, equipment, or loadout changes significantly affect the on-board hazard and/or risk. Deterioration of existing controls, modifications and additions to shipboard processes and equipment will occur over time. An update of the industrial hygiene survey is required at least every two years to address all changes that may have occurred. A more limited survey to address specific concerns is available at the discretion of the commanding officer. Examples of changes that could significantly affect the on-board hazard and/or risk are as follows:

(1) New or modified equipment or processes.

(2) Introduction of new hazardous chemicals and/or harmful physical or biological agents.

(3) Deterioration of existing controls (e.g., ventilation) which degrade over time.

Some of these changes would be the expected result of a shipyard availability period and commanding officers may consider requesting industrial hygiene assistance from their supporting NAVENPVNMEDU or MTF following a major availability.

For submarines, detailed atmosphere sampling, per reference A3-9, is required at the completion of a major shipyard availability or prior to post scheduled availability (PSA) to demonstrate that there are no built in contaminants as a result of construction activities and proper functioning of the atmosphere control system.

f. New construction. On new construction ships, industrial hygiene services are necessary prior to final contract trials (FCTs). This will assist the ship in correcting any deficient material conditions that may arise due to potential deviation by the builder from contract specifications. At a minimum, the supporting NAVENPVNTMEDU or MTF will perform the following services prior to the end of FCTs, and provide the ship a list of safety and health related material discrepancies and recommended corrective actions:

(1) An evaluation of ventilation systems used for the control of contaminants and for hazardous material (HM) stowage.

(2) An evaluation of occupational noise hazard areas/installed equipment (this is in addition to any ambient noise surveys conducted by the shipbuilder).

(3) An evaluation of the locations of plumbed and portable eyewash stations and deluge showers.

Initiate the baseline industrial hygiene survey for new construction ships as soon as possible after commissioning. Ships shall be in receipt of the completed survey report no later than six months after post shakedown availability.

g. Ship Class Database: The supporting NAVENPVNTMEDU or MTF will forward a copy of all industrial hygiene reports to the Navy Environmental Health Center for the purpose of updating the ship class profile. BUMED shall provide ship class profiles to new construction ships prior to FCTs. This is a generic database that characterizes shipboard hazards and control measures common to that class.

A0305. SHIPBOARD SAFETY SURVEY

a. Naval Safety Center conducts the shipboard safety survey of one or two day's duration. The interval between surveys,

surface ships and submarines, shall not exceed 36 months. The safety survey normally will be conducted during the Fleet Readiness Training Program (FRTP). The ship's immediate superior in command (ISIC) will allocate time early in the ship's FRTP so the commanding officer can use the safety survey results in deployment preparations. For two-crew submarines (e.g., SSBNs), the survey should be conducted during a refit/major maintenance period when both crews are on-board.

b. The shipboard safety survey includes training and a survey of a representative sample of the entire ship, identifying safety hazards, training safety officers and safety petty officers, and providing the commanding officer with an evaluation of the safety status of the command. The survey is intended to promote operational risk management as the primary tool in preventing mishaps and reducing the risks inherent to the operational Navy. The survey report shall be provided to the ship, including a relative standing for safety performance among the ship class. Within 30 days of the completion of the survey, commanding officers shall provide their ISIC, in writing, the status of the significant discrepancies identified during the survey and indicate those that have been corrected, those on the CSMP (including job sequence number (JSN)), and those beyond capability of the command to correct without outside assistance. To arrange a survey, contact the Naval Safety Center, Afloat Directorate, at SAFE-AFLOAT@navy.mil, or by naval message.

A0306. HAZARDOUS MATERIAL CONTROL AND MANAGEMENT ASSIST

Ships needing assistance for implementation, day-to-day operations, or equipment problems with their hazardous materials minimization centers (HAZMINCENs) may request an assist from the logistics support center (LSC) at the local fleet industrial supply center (FISC).

A0307. HAZARD REPORTING BY INDIVIDUAL CREWMEMBERS

Detection of unsafe or unhealthful working conditions at the earliest possible time and prompt control of hazards identified as a result is essential to a successful SOH program. The following procedure enables any member to submit a report of unsafe or unhealthful conditions:

a. All hands are encouraged to orally report unsafe or unhealthful working conditions to their immediate supervisor. That supervisor shall promptly evaluate the situation and take appropriate corrective actions. Supervisors will contact the division safety petty officer, the division officer, or the safety officer for assistance, if necessary. Inform the reporting crewmember of all actions taken.

b. If the notified supervisor has not taken action to investigate the situation or if they are not satisfied with the result, they may submit a written report of an unsafe or unhealthful working condition on a safety hazard report (OPNAV 3120/5, available on-line at https://forms.daps.dla.mil). The report may be handwritten and should simply state the nature of the condition and its location. If the originator desires that his or her name not be revealed, this should be so stated in the report.

c. Upon receipt of a report, the safety officer shall contact the originator to acknowledge receipt and discuss the seriousness of the reported condition. The safety officer shall advise the cognizant division officer that an unsafe/unhealthful working condition has been reported.

d. The safety officer will evaluate all submitted reports. Alleged critical danger situations will be evaluated immediately. If possible, potentially serious or moderate situations shall be evaluated within three days (see paragraph A0404 for descriptions of critical, serious, or moderate hazards or deficiencies). If necessary, the safety officer may request assistance from support activities for the evaluation.

e. Provide an interim or final response in writing to the originator of the reported condition under the authority of the safety officer within 10 working days of report receipt. Interim responses will include the expected date for a final response. If the evaluation identifies a hazard and its causative deficiency, the final response shall include a summary of the action taken for abatement of the deficiency. If no significant hazard is found to exist, the reply shall include the basis for that determination.

f. The final response shall encourage the originator to contact the safety officer if he or she desires additional

information or is dissatisfied with the response. If the originator remains dissatisfied after discussing the matter, the safety officer shall advise him or her of the right to appeal to the commanding officer. The appeal (or report) shall be in writing and contain, at least, the following information:

(1) A description of the condition including its location, nature of the alleged hazard, and standards violated (if known) (a copy of the original hazard report will suffice).

(2) How, when, and to whom the original report was submitted.

(3) What actions (if known) were taken as a result of the original report.

g. The commanding officer, or his/her representative, shall respond to the originator of the appeal within 10 working days. An interim response will suffice if the evaluation is incomplete at that time. If further appeal is warranted, refer to reference A3-2.

A0308. VARIANCES AND ALTERNATE STANDARDS

a. Variances. In certain situations, it may be impossible to comply with an applicable SOH standard. In this case, the safety officer can initiate a request for a variance by submitting the request to CNO (N09F) via the appropriate fleet commander and the chain of command. Variance requests shall explain why compliance is impossible and describe actions taken to achieve the maximum degree of protection possible.

b. Alternate Standards. In certain cases, it may be possible to achieve equal or better protection through the application of procedures/criteria different than those specified by a SOH standard. Submit proposed alternate standards to CNO (N09F) through the chain of command for approval.

A0309. FEDERAL AND STATE OCCUPATIONAL SAFETY AND HEALTH (OSH) INSPECTIONS OF NAVY, CIVILIAN, OR CONTRACTOR WORKPLACES ON BOARD NAVY SHIPS

This section provides guidance and procedures regarding requests by Federal or state OSH officials to inspect or investigate Navy civilian or contractor workplaces on board Navy ships in port or located at associated facilities (e.g., industrial activities).

a. Subject to the conditions and exceptions stated below, Navy afloat activities are advised that permission is granted for Federal OSHA compliance officials to be taken aboard U.S. Navy ships in port to conduct safety and health inspections and investigations of Navy civilian and contractor workplaces. State occupational safety and health officials **shall not** be granted access aboard naval ships and service craft or in areas of exclusive federal jurisdiction. A summary of inspector access is provided in appendix A3-B.

(1) Except for the limitations imposed in paragraphs A0309a(2) and (3), provide OSHA compliance officials, upon request, immediate access to Navy civilian or contractor workplaces where the Navy repair activity or contractor has equipment or other work-related material or paraphernalia in the workplace under government work or a government contract. Forward requests for access to inspect those workplaces where Navy civilian or contractor employees have worked or will work but where the work force is no longer deployed, or has yet to deploy any work-related material or paraphernalia, by message and by telephone to the CNO (N09F), copy to Commander, Naval Sea Systems Command (COMNAVSEASYSCOM) (copy to the Navy repair activity for Navy civilian workers), with information to the chain of command. All message requests shall identify the workplace involved and furnish all immediately available details. A reply to such requests will be forthcoming without delay.

(2) If the requested inspection/investigation involves handling or storage of ammunition or explosives, deny the request for access. Report any such request to the CNO (N09F), information to the chain of command (and for Navy civilians, to the Navy repair activity), by message.

(3) With respect to nuclear propulsion plant spaces on nuclear-powered ships, to related nuclear shipyard facilities,

ashore or afloat, shipboard nuclear support facilities, or to nuclear weapons areas, forward the request for access by message and by telephone to CNO (N09F) with copies to COMNAVSEASYSCOM (SEA-08) and the chain of command. All message requests shall identify the workplace involved and furnish all other immediately available details. Withhold access pending receipt of the reply and, where granted, shall be subject to the requirements of this chapter and any conditions imposed in the CNO reply. CNO will furnish such a reply expeditiously, and, if possible, within three working hours from receipt of the request by the CNO.

(4) In cases of non-nuclear ships or nuclear ships, with the exceptions in paragraphs A0309(a)(2) and (3), and under the procedures of paragraph A0309(a)(1), access to Navy civilian and contractor workplaces, as defined above, grant upon request to Federal OSHA compliance officials to conduct inspections and investigations of such workplaces within reasonable limits and in a reasonable manner during regular working hours except when other times are mutually agreed upon by the concerned officials.

(5) Photographs by OSHA officials shall not be taken. Any photographs requested by OSHA officials shall be taken by Navy personnel, shall be tentatively classified CONFIDENTIAL, and shall not be delivered to OSHA compliance officials until all film, negatives, and photographs have been sent to COMNAVSEASYSCOM (SEA 00D2) and fully screened and censored, as appropriate, in the interest of national security. Also, forward any design or system performance data (e.g., recordings of noise sound level profiles and light level readings) to COMNAVSEASYSCOM (SEA 00D2) for screening as described above prior to release. This process shall normally be completed within a period of 15 working days from receipt of material by NAVSEASYSCOM.

(6) OSHA officials shall not be given copies of any federal records or reports. If access to Navy records or reports is requested by OSHA officials, forward the request to the appropriate releasing official(s).

(7) In addition to presenting appropriate identification credentials, all OSHA compliance officials shall be required to possess appropriate security clearance for entry into areas where the workplace is located.

(8) Representatives of the ship's commanding officer, and, if appropriate, the activity contracting officer and the commanding officer or officer in charge of the shore activity at which the ship is located, and the commanding officer of the Navy repair activity (for Navy civilian employees) shall accompany the OSHA compliance official at all times during this physical inspection of Navy civilian or contractor workplaces. A representative of the contractor and a representative of the employees may accompany the OSHA compliance official during the inspection/investigation provided proper security clearances are verified. If there is no authorized employee representative, the OSHA compliance official is authorized to consult with a reasonable number of employees only (contractor or Navy civilian), concerning matters of health and safety in the pertinent workplace.

(9) OSHA compliance officials are authorized to question privately the contractor, contractor employee, Navy civilian employee, or their authorized representatives.

b. Unless specifically requested by the responsible OSHA official, commanders and ship commanding officers shall not provide contractors with advance notice of OSHA inspections except in cases of apparent imminent danger to Navy or contractor employees. Any person who violates the foregoing is subject to a fine of not more than $1,000 or to imprisonment of not more than six months, or both.

c. Report in writing to the CNO full information regarding any OSHA inspection/investigation aboard ship with a copy to COMNAVSEASYSCOM and the chain of command.

A0310. MEDICAL SURVEILLANCE

a. Purpose. The medical surveillance program is designed to monitor the continuance of the health of individuals in the fleet and serve the following purposes:

(1) Job certification/recertification to determine an individual's fitness to begin or continue to perform a job safely and effectively.

(2) To monitor the effectiveness of major hazard-specific (e.g., noise, heat, asbestos) programs by following the health status of exposed personnel.

(3) Secondary prevention to detect early indicators of excessive exposure caused by the work environment before actual illness, disease, or injury occurs and to allow for the timely implementation of corrective actions to prevent any long-term adverse effects.

(4) To comply with the requirements of certain SOH standards as noted in section B of this manual.

b. Selection of personnel. Selection of personnel for medical surveillance examinations is based primarily on the results of industrial hygiene surveys. Selection for some medical surveillance programs may be based on a history of past exposure to certain hazardous materials such as asbestos and cadmium. The medical department representative (MDR), using the recommended medical surveillance requirements from the industrial hygiene survey and assisted by the safety officer, division officer, division safety petty officer and workplace supervisor, will identify personnel who require medical surveillance following the guidance of enclosure (1) to reference A3-10. Periodic occupational medical examinations should be scheduled on a birth-month basis or as operational requirements permit. When there is no Navy standard for medical surveillance for a specific agent, personnel shall be placed under medical surveillance when the action level (1/2 of the permissible exposure limit) of the agent is exceeded and the exposure exceeds 30 days per year or 10 days per quarter. Detailed requirements for these examinations shall be established by the Chief, Bureau of Medicine and Surgery (CHBUMED).

c. Medical Examinations. The ship's MDR shall make all arrangements for required medical examinations. These examinations include baseline (pre-placement), periodic, termination, certification, and special examinations as required by section B of this manual. The scope of these examinations will be determined by reference A3-10. The MDR will provide all available information regarding each individual's exposure to allow the cognizant shore-based medical treatment facility (MTF),

squadron medical officer, or the ship's medical department, if resources permit, to perform the proper examination.

d. Evaluation of Results. The MDR shall monitor all medical surveillance results for any trends apparently due to hazard exposure.

e. Medical Records. Maintenance, retention, and disposition of personnel medical records shall be per existing directives. The MDR shall ensure that the results of all hazard exposure medical examinations and personal exposure records are entered into each individual's medical record. The MDR shall also inform each individual, verbally or in writing, as to the significance of all findings, and provide access to such records upon request. For submarines, exceedance of the continuance exposure limit (CEL) as defined by reference A3-9 shall be recorded in effected crew members' medical records. Recorded information shall include time, date, contaminants, concentration, duration of CEL exceedance, and any pertinent information as to the nature of the cause.

CHAPTER A3

REFERENCES

A3-1. OPNAVINST 3500.39C

A3-2. OPNAVINST 3120.32C

A3-3. OPNAVINST 5100.12H

A3-4. OPNAVINST 5100.25A

A3-5. INSURVINST 4730.1E, Trials and Inspections of Surface Ships, of date

A3-6. INSURVINST 4730.2E, Trials and Inspections of Submarines, of date

A3-7. OPNAVINST 5100.23G

A3-8. NEHC Technical Manual TM 6290.91-2, Industrial Hygiene Field Operations Manual, latest revision (NOTAL)

A3-9. NAVSEA S9510-AB-ATM-010/(U), Nuclear Powered Submarine Atmosphere Control Manual, of date

A3-10. NEHC Technical Manual TM OM-6260, Medical Surveillance Procedures Manual and Medical Matrix (NOTAL), of date

Appendix A3-A

Inspection of Department of the Navy Workplaces by Federal and State OSH Representatives

	AFLOAT		
	Contractor Workplaces	Civilian Workplaces	Exclusively Military Workplaces
FEDERAL OSH REPRESENTATIVES	YES [1,2,3]	YES [1,2,3]	NO
STATE OSH REPRESENTATIVES	NO	NO	NO

NOTES:
1. Ships or service craft must be in port; Navy Department will not transport Federal OSHA representatives to ships or service craft that are underway.
2. Federal and state OSH representatives have no jurisdiction over military unique operations or equipment. In addition, these officials are not authorized to inspect workplaces or operations for compliance with any standard implementing 10 U.S.C. 172 (explosive safety) or 42 U.S.C. section, 2012, 2021, or 2022 (nuclear safety).
3. Inspections may be announced or unannounced.

CHAPTER A4

HAZARD CONTROL AND DEFICIENCY ABATEMENT

A0401. DISCUSSION

There are three methods of controlling hazards. The first, and preferred, is to prevent the hazard at the design and acquisition stages. The second is to identify and eliminate existing hazards. The third is to reduce the likelihood and severity of mishaps from hazards that cannot be eliminated.

A0402. HAZARD PREVENTION

Hazards may be prevented or mitigated during the design and acquisition/alteration processes. Many effective actions that should be taken to improve safety at those planning and design stages include designing safety improvements, conducting system safety activities (per MIL-STD-882 – Standard Practice for System Safety), holding design reviews, and developing operating, purchasing, maintenance, and logistical procedures. Such activities are primarily the responsibility of the appropriate Systems Command (SYSCOM), with design input from TYCOMs and others [life cycle engineering manager (LCEM), ship program manager (SPM), fleets]. Since up front activities like these are beyond ship's force, only those actions which can be taken at the shipboard level to prevent or eliminate hazards will be addressed in this chapter.

a. Preventive Maintenance. Some hazards arise as the result of an inadequate preventive maintenance program. An effective shipboard preventive maintenance program can keep equipment and material from degrading to the point where it becomes an operational hazard.

b. Operating Procedures. Standard operating procedures (SOPs), instructions, or similar directives that are issued to identify the manner in which work is to be performed can prevent hazards from occurring. Obvious examples include tank cleaning, foul weather operations, and asbestos removal. Personnel must be familiar with the appropriate SOPs and current updates applicable to their duties.

c. Operational Risk Management (ORM). ORM is the process of identifying, assessing and controlling risks. The systematic ORM process, discussed in reference A4-1, is applicable to all missions and environments and shall be used in the shipboard environment to identify hazards and mitigate risk. ORM shall be applied not only to operational missions, but at the deck plate level for day-to-day work unit operations as well.

d. Purchasing Procedures. Afloat units procuring material and equipment at the local/unit level can prevent hazards by purchasing approved material or equipment in the proper quantity (i.e., that which can reasonably be expected to be used to accomplish the operation or task for which it was procured). Procurement of unauthorized, or excess, material or equipment can introduce hazards to the workplace, as well as create stowage and disposal problems. Hazardous material is of special concern. All local purchases of potentially hazardous material shall be accomplished per paragraph B0305 of this instruction. Note: If ordering items through a catalog, ensure you verify the item and national stock number (NSN) are authorized as required by chapters C23 and D15.

A0403. PRINCIPLES OF HAZARD CONTROL

Short of complete elimination of the hazard, methods of hazard control, in order of preferred application, are substitution, engineering controls, administrative controls, and use of personal protective equipment.

a. Substitution. The risk of injury or illness may be reduced by replacement of an existing process, material, or equipment with a similar item having a lower hazard potential. Care must be exercised in any substitution to ensure that the substitute materials are technically acceptable and that a new hazard is not being introduced.

COMNAVSEASYSCOM/COMNAVAIRSYSCOM should be contacted for substitution approval. To propose a substitution for a material, tool, or procedure called for on a maintenance requirement card (MRC), submit a PMS feedback report (FBR) per reference A4-2.

b. Engineering Controls. This means of hazard control is accomplished primarily through design and advanced planning. Whenever these methods are used, the cognizant safety officer or

industrial hygienist should approve these methods prior to implementation. Examples of engineering control methods include isolation and ventilation.

(1) **Isolation**. Isolation is the physical separation of a hazard from personnel to eliminate or minimize contact or exposure. This involves the use of a barrier or limiter and may be in the form of a physical barrier, use of semi-automatic equipment that does not require constant attendance (time-separation), or distance. Examples include machine guards, electrical insulation, sound barriers, and remote controlled equipment.

(2) **Ventilation**. This is the control of potentially hazardous airborne substances through the movement of air. Two methods are "general ventilation" or "dilution ventilation" and "local exhaust ventilation." General ventilation is the dilution of an airborne substance by mixing it with quantities of uncontaminated air. Local exhaust ventilation is the removal of an airborne substance at its source or point of generation. Local exhaust ventilation is the preferred and more economical method. The use of general ventilation should be limited to the control of heat/humidity or low toxicity materials if no other ventilation is possible. Ventilation requirements for airborne substance control must be determined through an industrial hygiene survey.

c. Administrative Control. This method of abatement employs special operating procedures to reduce the exposure of individuals to hazards. Examples include limiting access to high hazard areas or adjusted work schedules. Adjusted work schedules are appropriate only when the hazard is recognized as having a limit below which all personnel may be repeatedly exposed without adverse effect.

The amount of time by which a limit may be exceeded for short periods without injury depends on several factors such as the nature of the hazard, whether or not the effects are cumulative, the frequency with which the hazard occurs, and the duration of the hazard. All factors must be taken into consideration in determining whether a hazardous condition exists and whether or not exposures above the limit are permitted. Do not allow exposures above established limits without the commanding officer's approval.

d. Personal Protective Equipment (PPE). This method of hazard control is the least preferred because any equipment breakdown, failure, or misuse immediately exposes the wearer to the hazard. Nevertheless, there are instances where adequate risk mitigation cannot be achieved through other methods and personal protective devices must be used, either alone or in conjunction with other control measures. Training, maintenance of PPE, and user acceptance are key to the successful use of PPE to protect personnel. Chapter B12 of this manual discusses personal protective equipment in general. Other chapters describe personal protective equipment requirements for specific programs and hazards.

A0404. HAZARD ABATEMENT PROGRAM PROCEDURES

The hazard abatement program is a process by which identified hazards that are not able to be immediately corrected are recorded and tracked to completion. Hazards are tracked until verified as corrected or eliminated. Some hazards may be corrected by ship's force, while others may require documentation to ensure they are noted for correction during availabilities or maintenance periods.

a. Some deficiencies can be corrected "on the spot." When this is possible, the division officer will either notify the safety officer or complete the applicable portion of the Safety Hazard Report and return it to the safety officer via the appropriate department head. This documentation is useful in the identification of similar hazards and trends.

b. Shipboard hazards that cannot be corrected "on the spot" shall be documented in the work-center deficiency log (WCDL)/job sequence number (JSN) log per reference A4-1, if applicable. The ship's 3M Coordinator shall forward any on-board maintenance management system - next generation (OMMS NG) safety hazard entries to the safety officer for review.

c. The safety officer shall provide the results of workplace inspections, industrial hygiene surveys, and Safety Hazard Reports (OPNAV 3120/5) to the division officer in charge of the operation/space evaluated. Upon receipt of this report, the division officer shall take prompt action to ensure correction of each identified deficiency.

NOTE:

When cases of imminent danger are identified, the senior person on the scene must be notified and must stop all work immediately except in an operational emergency. Notify the commanding officer of the situation, and take action as soon as possible. Imminent danger is defined as a shipboard condition that immediately threatens the loss of life, bodily injury, or illness to personnel.

d. The safety officer shall retain or maintain documentation of those hazards identified through inspections, surveys, or as reported by individuals. A log, notebook, electronic spreadsheet, or other means may be used as documentation of hazards awaiting correction or resolution. For each hazard documented, the safety officer shall assign a risk assessment code (RAC). Documentation for hazards shall consist of the following, at a minimum:

(1) Date, time, location, and description of hazard.

(2) Risk assessment code (RAC).

(3) Recommended corrective action to control or eliminate hazard.

(4) Action taken to implement that correction (e.g., who was notified, submitted a 4790/2K, when scheduled for availability, etc.)

(5) Verification and date hazard corrected/eliminated.

e. External Hazard Reports (HAZREPs). In some instances, where it would be helpful or prudent to notify others outside of the command of the hazard, the safety officer should complete a hazard report, using the web-enabled safety system (WESS), per reference A4-3.

f. Risk Assessment. The safety officer shall assign a RAC to each identified hazard that cannot be corrected immediately. The RAC provides a measure of the degree of risk associated with a deficiency by combining both the severity of the hazard and the mishap probability. The RAC provides a priority for the correction of deficiencies. The RAC is derived as follows:

(1) **Hazard Severity.** The hazard severity is an assessment of the worst reasonably expected consequence, defined by degree of injury, illness, or physical damage which is likely to occur as a result of the hazard. Hazard severity categories are assigned Roman numerals according to the following criteria:

Description	Category	Results
CATASTROPHIC	I	The hazard may cause death, loss of facility/asset or result in grave damage to national interests.
CRITICAL	II	The hazard may cause severe injury, illness, property damage, damage to national or service interests or degradation to efficient use of assets.
MARGINAL	III	The hazard may cause minor injury, illness, property damage, damage to national, service or command interests or degradation to efficient use of assets.
NEGLIGIBLE	IV	The hazard presents a minimal threat to personnel safety or health property, national, service or command interests or efficient use of assets.

(2) **Mishap Probability.** The mishap probability is the likelihood that a hazard will result in a mishap, based on an assessment of such factors as location, exposure in terms of cycles or hours of operation, and affected population. Mishap probability is assigned a letter according to the following criteria:

Subcategory	Description
A	Likely to occur immediately or in a short period of time.
B	Probably will occur in time.
C	May occur in time.
D	Unlikely to occur.

(3) **Risk Assessment Code (RAC).** To derive the RAC from the elements of hazard severity and mishap probability, use the matrix shown below. The RAC is expressed as a single Arabic number (1, 2, 3, 4, or 5) that can be used to help determine hazard abatement priorities.

		Mishap Probability			
		A	B	C	D
Hazard Severity	I	1	1	2	3
	II	1	2	3	4
	III	2	3	4	5
	IV	3	4	5	5

Code Description

1. **Critical Safety or Health Deficiency – Correct as Soon as Possible**
   This is a deficiency which presents a critical safety hazard to personnel or machinery or health hazard to personnel which must be corrected immediately. This code is to be used for items such as electric shock hazards, inoperative interlock or safety devices, missing or damaged lifelines, inoperable escape scuttles, a leaking refrigerant system into a confined space, leaking component containing PCBs, and the like. All efforts must

be exerted to correct these items prior to any other maintenance deficiencies. Suspension of use of equipment/system/space is mandatory.

2. **Serious Safety or Health Deficiency - Suspension of Equipment/System/Space Use is Required**
These items deal with serious safety hazards to personnel or machinery or health hazards which must be corrected prior to resuming use of equipment/system/space.

3. **Moderate Safety or Health Deficiency -Waiver of Equipment/System/Space Use is Granted Pending Correction of the Item**
This category is to be used in cases where the equipment/system/space can be operated or utilized in a satisfactory manner without greatly risking personal injury, serious damage to the equipment/system/space, or greatly risking personal health.

4. **Minor Safety or Health Deficiency**
This is a category of safety or health deficiency that should be corrected when resources become available, but use of equipment/system/space is unrestricted.

5. **Negligible Safety or Health Deficiency**
This category is used to identify those deficiencies that are noted for record purposes and may be corrected when other work is accomplished on the equipment/system/space.

A0405. INTERIM CONTROLS

a. As soon as it is recognized that immediate correction of workplace deficiencies is not possible, establish and document appropriate interim controls on the safety hazard report. Interim controls may consist of physical barriers, written instructions, word passed over the 1 multi-channel (1MC), warning signs, or other measures as deemed appropriate. Interim controls shall meet or exceed minimum necessary requirements to prevent future damage to equipment or injury/death to personnel. The safety officer shall approve interim controls in effect more than 60 days.

b. Notify the commanding officer if an unabated deficiency is classified as critical or serious (RAC 1 or 2), and determine

who will personally approve interim protective measures. The appropriate department head shall approve interim controls for other unabated deficiencies.

CHAPTER A4

REFERENCES

A4-1. OPNAVINST 3500.39B

A4-2. OPNAVINST 4790.4D

A4-3. OPNAVINST 5102.1D/MCO P5102.1B

CHAPTER A5

TRAINING

A0501. DISCUSSION

a. Safety and occupational health (SOH) training is an integral part of operational risk management (see reference A5-1). References A5-2 through A5-4 reflect federal standards that require all safety managers, supervisors, and workers to be trained in safety program requirements and responsibilities, safety standards, recognition of hazards, and the safety hazard reporting process.

b. SOH training policy and requirements of this manual are implemented by the Navy safety and occupational health Navy training systems plan (NTSP S-40-8603E) (NOTAL). The ship's training officer, safety officer and divisional safety petty officers (leading petty officers for submarines) are responsible for implementing afloat safety training requirements.

A0502. SOH TRAINING FOR SHIPBOARD DUTIES AND PROGRAMS

a. Training consists of detailed courses regarding specific duties involved with supervising SOH Programs. The following training is available for ship and submarine safety officers and divisional safety petty officers, either as classroom courses, video tele-training (VTT) courses, computer-based training (CBT) or through Navy knowledge on-line (NKO). Specific information may be found at: http://www.safetycenter.navy.mil/training.

(1) **Afloat Safety Officer Course (A-4J-0020)**. This course is imbedded into the Department Head Course at Surface Warfare Officer School (SWOS), Newport, and is exported as a classroom course to major fleet centers. It trains officers in safety duties aboard Navy surface ships and includes instruction in the procedures for establishing and maintaining an effective ship's safety organization.

(2) **Safety Programs Afloat Course (A-493-2099)**. This course is offered by the NAVOSH and Environmental Training Center (NAVOSHENVTRACEN). This course provides surface ship supervisory personnel, E-5 through E-9, assigned as divisional

safety petty officers or safety supervisors, with the basic knowledge and skills required to carry out their duties. It also identifies responsibilities per this instruction and other applicable safety requirements. The Naval Safety Supervisor Course (NAVEDTRA 14167) is a pre-requisite.

(3) **Submarine Safety Officer Course (F-4J-0020)**. This course is taught by the NAVOSHENVTRACEN and provides submarine-qualified commissioned officers, chief petty officers, and selected first class petty officers who have been assigned as collateral duty safety officers aboard submarines, with the training to develop and maintain an effective submarine safety program

b. **Hazardous Material Control and Management Technician (HMC&M) Course (A-322-2600 or A-322-2601)**. This course is taught by the NAVOSHENVTRACEN. It provides afloat and shore military HMC&M Technicians with the training required to safely handle, use, store, dispose, transfer and offload hazardous material (HM)/hazardous waste (HW). Successful completion of this course confers the secondary Navy enlisted classification (SNEC) code 9595. Ships manning documents specify the require-ments for personnel holding this SNEC.

c. Appendix A5-A provides a list of Navy educational courses related to safety and occupational health. Appendix A5-B is a listing of safety and occupational health courses taught at the Navy Environmental and Preventive Medicine Units (NAVENVPVNTMEDUs). The command's training officer should be consulted for course location, eligibility requirements, and schedules. Course descriptions and other information are available at www.safetycenter.navy.mil/training.

A0503. SOH TRAINING REQUIREMENTS AND RESPONSIBILITIES

a. Ship safety officers shall attend the Afloat Safety Officer course, and submarine safety officers shall attend the Submarine Safety Officer Course prior to, or within six months of, assuming their duties. Safety officers who are graduates of Surface Warfare Officer School (SWOS) Department Head (DH) Course meet this requirement. Group and squadron safety officers (surface ship or submarine) shall attend the applicable safety officer course if they have not completed the SWOS DH Course or Submarine Safety Officer Course. If operations do not

permit the prospective collateral duty safety officer to attend formal training prior to assuming the position, he/she shall attend formal training at the first opportunity and, in the interim, complete the Naval Safety Supervisor Course (NAVEDTRA 14167). Safety officers and assistant safety officers should attend the Navy Ergonomics Program Course. Additional training may be obtained via courses offered by the NAVOSHENVTRACEN, conferences, and workshops related to the elements required by the command's specific safety program.

b. Within six months of being assigned, all divisional safety petty officers aboard ship shall complete the Naval Safety Supervisor Course (NAVEDTRA 14167) and Watch Station 301 of the safety programs afloat PQS (NAVEDTRA 43460-4B). In addition, at least fifty percent of all divisional safety petty officers shall attend the Safety Programs Afloat (SPA) Course (CIN A-493-2099) or the Aviation Safety Specialist Course (CIN A-493-0065) taught by the NAVOSHENVTRACEN. Divisional safety petty officers shall have a minimum of one year remaining before their projected rotation date (PRD). Completion of the Naval Safety Supervisor and the SPA courses satisfy part of the requirements for the Navy safety technician secondary Navy enlisted classification (SNEC) code 9571. (This paragraph is not applicable to submarines).

c. The safety officer will ensure SOH training is conducted as indicated in appendix A5-A. For submarines, this training may be integrated into phase one of submarine qualification.

d. Indoctrination training conducted by each command will concentrate on the practical aspects of the SOH program as implemented aboard ship and will include:

(1) Introduction of the SOH program and identification of key personnel, the chain of command, and mishap reporting.

(2) Hazard identification and risk assessment of known hazards (heat, noise, asbestos, hazardous material, and electrical shock, for example as applicable) and operational risk management (ORM) techniques per reference A5-1.

(3) Safety precautions and standards (section C or D)

(4) Safety, warnings/caution signs, and deck markings.

(5) Mishap prevention and reporting safety hazards, including their right to a timely response on a safety report and their right to appeal.

(6) Hazardous materials spill response training including the process of reporting a hazardous material spill on the ship.

(7) Oil spill emergency spill response training including the process of reporting an oil spill on the ship.

e. Conduct SOH training on safety precautions and potential hazards applicable to a division as part of the ongoing ORM process. Operational risk management training may be conducted prior to scheduled evolutions (such as CONREP, VERTREP, aircraft operations, towing, anchoring, or engineering drills) or at scheduled divisional training periods. Division officers shall ensure assigned personnel receive mandatory training on safety programs (e.g., heat stress, electrical safety, hazardous material control and management, the SOH program, and hearing conservation) and that at least two safety briefs are conducted at quarters or muster each month. Appendix A5-A is a consolidated list of training requirements directed by this instruction.

f. At a minimum, commands shall conduct one safety stand-down per year. Additional safety stand-downs may be warranted at the discretion of the commanding officer.

g. Where specified in this instruction division officers shall ensure training is documented using Navy career development program databases (e.g., R-Admin, COMPASS) or other standard electronic or hardcopy means. Divisional safety petty officer training completion shall be tracked by the safety officer. Training accomplishment shall be part of the annual safety self-assessment.

A0504. TRAINING RESOURCES AND PUBLICATIONS

a. A complete list of occupational safety and health correspondence courses can be found in appendix A5-C.

b. A number of safety periodicals are available to afloat commands. Articles from these periodicals can be used for general command safety training, division safety training, and plan of the day notes.

(1) **Ships Safety Bulletin - Issued quarterly by COMNAVSAFECEN.** Contains articles on shipboard safety problems, accident trends, and current technical information.

(2) **SeaShore Magazine - Issued quarterly by COMNAVSAFECEN.** Publicizes fleet-wide safety programs and provides information on afloat and shore mishap prevention. Also contains shore hazard information and mishap statistics about occupational safety and health, fire, motor vehicles, weapons and explosives, and off-duty and recreational topics. Issued by COMNAVSAFECEN.

(3) **Approach - Issued quarterly by COMNAVSAFECEN.** Aviation mishap prevention for naval aviators, flight officers, and air-crewmen.

(4) **Mech - Issued quarterly by COMNAVSAFECEN.** Articles on hazards, policy, and equipment information pertinent to readiness and safety in aviation maintenance at all levels of responsibility.

(5) **FLASH (Factual Lines About Submarine Hazards) - Issued quarterly by COMNAVSAFECEN.** A mishap prevention bulletin containing a summary of research from selected reports of submarine hazards. It is intended to give advanced coverage of safety-related information while reducing reading time.

(6) **Diving Safety Lines (DSL) - Issued quarterly by COMNAVSAFECEN.** Summary of the results of research from selected reports of diving hazards.

(7) **Ground Warrior – Issued bimonthly.** Marine Corps tactical operation safety.

(8) **Type Commander Newsletters, Advisories and Safety Notes.**

CHAPTER A5

REFERENCES

A5-1. OPNAVINST 3500.39B

A5-2. DoD Instruction 6055.1, DoD Safety and Occupational Health (SOH) Program, of date

A5-3. SECNAVINST 5100.10J

A5-4. OPNAVINST 5100.8G

Appendix A5-A
TRAINING REQUIREMENTS SUMMARY

*Courses can be, Mandatory(M), Formal(F), Informal(I)

Navy Personnel Training Requirement	Paragraph/ Reference	Course Title/Training Required*	Resource for Training	Length of Training	Periodicity
All hands	A0502c	General Ergonomics Awareness MI	Powerpoint Ship's instructors	TBD	Initially
Submarine safety officer - qualified E-6 personnel, chief petty officers, and commissioned officers.	A0503a	Submarine Safety Officer Course (F-4J-0020) MF	NAVOSHENVTRACEN	3 Days	Prior to or within 6 months of assignment
For prospective collateral duty safety officer or full-time safety officer	A0503a	Naval Safety Supervisor Course MF	NAVEDTRA 14167	TBD	Interim measure, until the Safety Officer Course can be attended.
Collateral duty or full time safety officers	A0503a	Afloat Safety Officer Course (A-4J-0020) MF	Surface Warfare Officer School (SWOS), Newport (See Note[1])	7 Days	Prior to or within 6 months of assignment

Navy Personnel Training Requirement	Paragraph/ Reference	Course Title/Training Required*	Resource for Training	Length of Training	Periodicity
Afloat Industrial Hygiene Officers (IHOs)		Annual continuing education[MI]	Navy Occupational Health and Preventive Medicine Workshop	TBD	Annual
[1]Division safety petty officers	A0503b	Division Safety Petty Officer, Watchstation 301, Naval Safety Supervisor[MI]	Supervisor, Safety Programs Afloat PQS, NAVEDTRA 14167	TBD	Within 6 months of assignment
Fifty percent of the petty officers assigned as division safety petty officers aboard ship	A0503b	Safety Programs Afloat (A-493-2099) or Aviation Safety Specialist (A-493-0065)[MF]	NAVOSHENVTRACEN	2 Days 3 Days	Within 6 months of assignment
All hands	A0501a C0103a D0103a	Occupational Safety and Health Training[MI]	Videotapes, Ship personnel	TBD	After reporting on-board and annually thereafter
Personnel designated to be on the EART	Appendix B1-C(6)	Shipboard Asbestos Response" (A-760-2166)[MF]	NAVOSHENVTRACEN	2 Days	Initially

[1] Must have at least 1 year before projected rotation. Not applicable to submarines.

Navy Personnel Training Requirement	Paragraph/ Reference	Course Title/Training Required*	Resource for Training	Length of Training	Periodicity
All personnel performing non-friable asbestos work: · Limited asbestos-containing floor tile removal · Asbestos-containing gasket replacement · Asbestos-containing brake assembly maintenance	B0104g	Asbestos Removal Procedures detailed in Appendix B1-B[MI]	For ships with no EART (**See NOTE[2]**) For ships with an EART (**See NOTE[3]**)	TBD	On-the-job training
All personnel that are required to wear personal protective clothing and equipment	B1202 (c) B1203e(3)	Proper Wear and Maintenance of Clothes and Equipment[MI]	Division Officer	TBD	Prior to initial use and at Division Officer's discretion thereafter
All Hands	B0206a	Heat-Stress Training[MI]	Videotape (Play it Cool)	TBD	Upon reporting aboard
Heat-stress surveyors assigned to perform WBGT surveys	B0206b	Heat-Stress Surveyor Watchstation 303[MF]	Safety Programs Afloat PQS 303, NAVEDTRA 43460-4A	TBD	Qualify within 12 weeks of assignment
HM Supervisor	B0302c(2)	HMC&M Technician Course (A-322-2600) or (A-322-2601)[MF]	NAVOSHENVTRACEN	4 days	Initial
Hazardous Material(HM) Coordinator	B0302c(1)	Afloat HM Coordinator Course (A-8B-0008)[MF]	Navy Supply School	2 days	Prior to or within 6 months of assignment

Navy Personnel Training Requirement	Paragraph/ Reference	Course Title/Training Required*	Resource for Training	Length of Training	Periodicity
Damage control teams required to combat HM spills/releases	B0304a(1)b B0304b(2) B0304d(1)a	HM/HW Emergency Procedures[MI]	DCA	TBD	Determined by DCA
Workcenter personnel	B0302a(12)b	Proper Procedure for Handling HM/HW[MI]	HM Coordinator/ Workcenter Supervisor	TBD	Prior to using or handling HM
All hands	B0302a(2) B3-C (69)	Job Specific HM/HW training[MI]	Workcenter supervisor	TBD	Initial
Assistants to the HM coordinator, personnel who control the day-to-day operation of the HMC&M program and personnel who manage the HAZMINCEN	B0302a(4)a	HM Control and Management Technician Course (A-322-2600)or (A-322-2601)[MF]	NAVOSHENVTRACEN	4 days	Initial
Personnel wearing hearing protection device (HPD) not in HCP	B0402(d) (3)	Use and Maintenance of HPDs[MI]	Division Officer/MDR	TBD	Initial
Personnel working in noise hazardous areas or with noise hazardous equipment	B0408a	Initial Training[MI]	MDR	TBD	Prior to beginning work and annually thereafter
All personnel in the Hearing Conservation Program	B0408b	Refresher Training for the HCP-Enrolled Personnel[MI]	NEHC Technical Manual, TM-6260.51.99-2, Navy Medical Department Hearing Conservation Program Procedures	TBD	Annually

Navy Personnel Training Requirement	Paragraph/ Reference	Course Title/Training Required*	Resource for Training	Length of Training	Periodicity
Respiratory Protection Manager	B0602b(1)	Respiratory Protection Program Manager (A-493-0072)[MF]	NAVOSHENVTRACEN	4 Days	Prior to assuming duties
All personnel performing preventive maintenance on brake assemblies	Appendix B1-B, 7	Respirator Fit-Testing, Selection, and Maintenance[MI]	Respiratory Protection Manager	TBD	Prior to donning a respirator, and annually thereafter
All personnel required to wear respirators	B0612a	Use and Maintenance of Respirators[MI]	Respiratory Protection Manager	TBD	Prior to use and annually thereafter
All-Hands	B0702(b) (1)	Basic Electrical Safety and PPE Use[MI]	Safety Officer, Electrical Officer, Electronics Material Officer	TBD	Once reporting aboard and annually thereafter
CPR Instructor	B0708b	CPR Certification[MF]	Training per American Heart Association, American Red Cross, or equivalent.		
Personnel who man the portable electrical tool issue room	B0708c	Electrical Tool Issue Room Watchstation 302[MI]	Safety Programs Afloat PQS, NAVEDTRA 43460-4A	TBD	Within 16 weeks of assignment

Navy Personnel Training Requirement	Paragraph/ Reference	Course Title/Training Required*	Resource for Training	Length of Training	Periodicity
Electrical Safety Officer	B0708d	Watchstation 304[MI]	Safety Programs Afloat PQS	TBD	Within 16 weeks of assignment
All newly reporting personnel assigned to work in RADHAZ areas	B0902(1)c	Awareness Training[MI]	Radiation Safety Officer/ Workcenter Supervisor	Appendix B9-A/ Baseline IHS	Upon reporting to workcenter

Detailed information regarding class schedules, quotas, etc. can be found on the NAVOSHENVTRACEN website at http://www.safetycenter.navy.mil/training//.

NOTE[1] For officers who have attended Department Head Course at Surface Warfare Officer School, this course contains the material covered in the Afloat Safety Officer Course (A-4J-0020) and is considered the equivalent. Completion of the Department Head Course satisfies the requirements for A-4J-0020.

NOTE[2] For ships with no Emergency Asbestos Response Team (EART), this training shall be accomplished by the safety officer or engineering officer as on-the-job training using the Standard Operating Procedures in appendix B1-B.

NOTE[3] For ships with an EART, this training shall be accomplished by the safety officer or engineering officer, or a member of the EART that has successfully completed "Shipboard Asbestos Response" A-760-2166, or Asbestos Supervisor/Worker (A-493-0069) as on-the-job training using the Standard Operating Procedures in appendix B1-B.

NOTE

Many NAVEDTRA manuals contain specific safety information related to the specific topic. Refer to the Catalog of Nonresident Training Courses (NAVEDTRA 12061) for a current listing of available products. The catalog may be accessed for view/download from: http://www.advancement.cnet.navy.mil

Appendix A5-B

Safety and Occupational Health-Related Courses Taught At Environmental and Preventive Medicine Units (NAVENPVNTMEDUs)

The following is a listing of Occupational Health and Preventive Medicine training courses including the appropriate course number and the NAVENPVNTMEDUs (abbreviated EPMUs below for convenience) at which it is taught. These courses are not controlled by Commander, Naval Education and Training Command (NETC) or by Commanding Officer NAVOSH and Environmental Training Center (NAVOSHENVTRACEN) and are not equivalent to NAVOSHENVTRACEN courses.

1. Health Effects/Control of Asbestos and Other Thermal Insulation (B-322-2330) (Hazard awareness and not asbestos ripout training)(EPMU-6)

2. Analysis of Airborne Asbestos Samples (B-322-2333) (EPMU-2, 6)

3. Analysis of Bulk Asbestos Samples (B-322-2334) (EPMU-2, 5, 6)

4. Heat Stress Afloat (B-322-2320) (EPMU-2, 6)

5. Hearing Conservation Afloat (B-322-2310) (EPMU-2, 6)

6. Industrial Hygiene Techniques/Workplace Monitoring (B-322-2306) (EPMU-6)

7. Lead Hazards and Control (B-322-2332) (EPMU-6)

8. Hazardous Material Awareness/Control (B-322-2365) (EPMU-6)

9. Basic Preventive Medicine & Epidemiology (B-6H-0017) (EPMU-2)

10. Food Safety Managers (B-322-2101) (EPMU-2)

11. Malaria Prevention & Control (B-322-2209) (EPMU-2)

12. Lab Identification of Malaria (B-322-2210) (EPMU-2)

13. Shipboard Pest Management (B-322-1075) (EPMU-2)

NOTE:

The courses, titles, and numbers are subject to change. Check with the appropriate NAVENPVNTMEDU or the CANTRAC for course name, content and convening date. NAVENPVNTMEDUs are at the following locations:

TWO	Norfolk, Virginia
FIVE	San Diego, California
SIX	Pearl Harbor, Hawaii

Similar training may be available from cognizant industrial hygiene staff.

CHAPTER B1

ASBESTOS MANAGEMENT

B0101. CHAPTER ORGANIZATION

a. The chapter has been reorganized to clarify ships' requirements and responsibilities for management of asbestos exposure.

b. There are three categories of asbestos work that can be performed aboard ship (paragraph B0105). These categories are referred to in this chapter as asbestos work protocols. Individual asbestos work protocols, which detail plan work scope, plan responsibilities, and equipment and training requirements, are included for each type of asbestos work.

c. This chapter contains two types of information. Paragraphs B0101 through B0106 contain information that is general in nature, and is mandatory for all ships. Paragraphs B0107 through B0109 detail information that is applicable to ships relative to the asbestos work protocol under which the ship must operate (paragraph B0105).

B0102. APPLICABILITY

Navy policy is that asbestos-contaminated insulating materials will not be used on U.S. ships. Naval Sea Systems Command (NAVSEASYSCOM) cannot definitively establish that a ship is free of asbestos-containing materials (ACM). Any previous guidance that may have exempted ships from establishing and maintaining an asbestos plan has been deleted from reference B1-1. Because of this, and the fact that all U.S. Navy ships contain some form of ACM, **all ships shall implement and maintain an asbestos management plan. This chapter, including work protocols, combined with supplemental recommendations and information, such as locations of ACM and suspected ACM, provided as part of the industrial hygiene survey shall constitute the ship's asbestos management plan. Commanding officers shall ensure that all required resources and personnel are assigned to accomplish this plan.** Ships with qualified teams to perform asbestos repair or removal may do so. However, due to inconsistent state-to-state, and increasingly stringent federal, air emissions reporting

requirements, each ship is required to contact their type commander's (TYCOM) industrial hygiene officer (IHO), and/or regional environmental coordinator (REC) to determine specific local emissions reporting guidance.

a. All ships shall implement, at a minimum, the protocol for ship's force (paragraphs B0105a and B0107). A ship may be required to implement and maintain an additional protocol - the protocol for emergency asbestos response team (EART) (paragraphs B0105b and B0108).

b. Any ship whose keel was laid prior to 1980 will be considered to contain friable asbestos thermal systems insulation (TSI), and shall therefore maintain an EART. Ships in this category shall implement and maintain both the ship's force (B0107) and EART (B0108) protocols.

c. Any ship whose keel was laid during or after 1980, per reference B1-2, was prohibited from being constructed with TSI, and by definition, does not require an EART. TSI repair work performed by facilities and contractors controlled by U.S. maritime regulations prevented asbestos TSI from being introduced onto the ship. Those same regulations were not always enforceable for work conducted by non-U.S. regulated repair facilities or contractors. See Note below for details.

NOTE:

Any ship that has had TSI repair work performed in any non-U.S. Navy regulated facility or contractor, should be handled as if the ship contains asbestos TSI, unless supporting documentation, substantiated by laboratory analysis (see B0104a(3)), can document that ACM was not introduced onto the ship. **Any ship, having any TSI repairs by any non-U.S. regulated facility or contractor, without supporting documentation to guarantee that no ACM was introduced onto the ship, regardless of the age of the ship, shall maintain an EART**. Therefore, all ships shall maintain, or have access to, adequate supplies of asbestos-free insulating materials for use in routine and emergency repair work conducted in non-U.S. operated facilities to prevent the introduction of ACM.

A non-U.S. regulated facility or contractor is defined as **"any facility or contractor outside the direct controls of the contracting official for all materials and work practices**

used during the repair."

B0103. DISCUSSION

a. Asbestos is a fibrous mineral that can be produced into a material that is fireproof, possesses high tensile strength, good heat and electrical insulating capabilities, and moderate to good chemical resistance. Because of these characteristics, asbestos has traditionally been used as thermal and acoustical insulation, pipe lagging, gaskets, brake and clutch linings, winch and capstan brakes, and roofing and flooring materials.

b. Asbestos fibers are a known health hazard. Inhalation of asbestos fibers has been demonstrated to cause at least two distinct disease states, asbestosis and cancer. Asbestosis is a progressively worsening disease of the lung and is recognized as a classic disabling or even fatal occupational disease. Asbestos has also been found as a causal factor in the development of lung cancer and of malignant pleural mesothelioma, and it is suspected of causing cancer of the gastrointestinal tract. When coupled with smoking tobacco products, the risk of developing lung cancer is increased dramatically. Mesothelioma is a rare malignant tumor of the membrane that lines the chest and abdominal cavity. It is rarely found except in those exposed to asbestos. Most symptoms of these asbestos-related diseases do not show up until 10-45 years after exposure.

c. Asbestos insulation and other asbestos-containing materials are normally not a health hazard when in good condition, secured in place, and unlikely to be disturbed. Bound asbestos materials, such as most gaskets, floor coverings, and cements are not generally health hazardous except when worked by punching, grinding, machining, or sanding or when the material is deteriorated. Of primary concern is asbestos that has the potential to become airborne through friability (able to be crushed under hand pressure). Gasket material that has been exposed to high heat over time, and damaged asbestos packing materials may also be friable.

d. There are no known acute (immediate) effects associated with exposure to asbestos. Therefore, avoid breathing asbestos dust even though it may not seem to produce any harmful effects at the time of exposure. There is only one way to completely prevent the possibility of asbestos-related illness, and that is

to eliminate asbestos from the work environment. Since total removal is not possible, the Navy has instituted a plan to control the use of asbestos and to replace any removed asbestos with a non-asbestos substitute where technically acceptable substitutes have been identified.

e. Asbestos is normally found aboard ship in insulation and lagging for high temperature machinery, boilers and piping, in Garlock®-type gasket material, electrical wiring, certain deck tiles and decorative paneling, and some packing material. For purposes of this afloat instruction, ACM is characterized as one of two types:

(1) **Friable.** Friable ACM is defined as material that can be crumbled, pulverized, or reduced to powder under hand pressure, thereby releasing airborne fibers. Friable ACM represents the most significant health hazard, because airborne fibers can be released during normal work operations. Typical examples are:

(a) Pipe lagging.

(b) Acoustical insulation.

(c) Sheet gasket material used in high temperature applications.

(2) **Non-friable.** This form of ACM, when dry, cannot be crumbled, pulverized or reduced to powder by hand pressure. The asbestos fibers in these materials cannot be readily released into the air under normal work conditions. Some examples are:

(a) Brake and clutch linings.

(b) Gaskets and adhesives.

(c) Floor tile and adhesives.

B0104. ASBESTOS CONTROL ELEMENTS

a. Identification of Asbestos Hazards

(1) Per chapter A3, an industrial hygienist shall survey all work places as part of the industrial hygiene survey. During this survey, the industrial hygienist shall identify any hazards associated with asbestos and provide recommended actions to the ship to eliminate or minimize the asbestos hazard. This information shall be included in the industrial hygiene survey and used to complete the asbestos management plan.

(2) It is necessary to determine if thermal insulation, due to be handled by ship's force for repair or removal, contains asbestos, prior to the time each repair or removal is to be performed. For non-nuclear propulsion spaces, a sample of the insulation material shall be obtained following the procedures in appendix B1-A, and submitted for analysis.

(3) For nuclear propulsion spaces, a thorough determination for the presence of asbestos prior to initiating thermal insulation shall be conducted. Reliable documentation, such as ship's drawings, work control documents, material history drawings, and prior sample results may be used to determine whether the material to be worked is free of asbestos. If documentation is unavailable, unreliable, or questionable, a sample of the insulation material shall be obtained following the procedures of B1-A and submitted for analysis.

(4) It is impossible to identify asbestos based solely on a visual inspection. Therefore, thermal insulation, especially on ships that were built before 1980, should be handled as if it contains asbestos, unless the insulation material is shown to be asbestos-free by laboratory analysis, or for nuclear propulsion plant spaces by reliable documentation addressed in the preceding paragraph (B0104a(3)). Ships having asbestos identification capability can provide this laboratory service, to positively identify suspected asbestos-containing materials. Naval shipyards, Navy Environmental Preventive Medicine Units (NAVENPVNTMEDUs), and medical treatment facilities (MTFs) also have the capability to test materials for the presence of asbestos. Identification by polarizing light microscopy or transfer electron microscopy (TEM) is acceptable.

(5) There are many means of marking asbestos-free thermal insulation. Do not rely on any such systems as positive identification of non-asbestos material.

b. Management of Asbestos in the Workplace

(1) Navy policy is to eliminate asbestos exposure hazards by substitution of ACM with asbestos-free materials, approved under the technical management of the NAVSEASYSCOM. The command shall not remove installed ACM, which are in good condition, for the sole purpose of eliminating asbestos. Where substitution is not possible, the command shall use engineering controls or and/or personal protective equipment. The command shall prohibit the use of administrative controls, (e.g., personnel rotation) as a means of keeping the exposure below the permissible exposure limit (PEL).

(2) Specific procedures to control the accumulation of asbestos-laden waste, dust, and scrap materials are found in the individual work protocol standard operating procedures (SOPs) (appendix B1-B for ship's force and appendix B1-C for emergency asbestos response team).

(3) **Warning Signs and Labels**

(a) The command shall provide and display warning signs, which comply with reference B1-3, at each location where asbestos work is performed. Post signs at a sufficient distance from the work area that personnel may read the signs and take necessary steps before entering the area. A listing of required protective equipment may be attached to, or be a part of the sign. The warning sign shall state:

DANGER

ASBESTOS CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
MAY BE REQUIRED IN THIS AREA

This warning sign is available from standard stock under NSN 9905-01-345-4519.

(b) Affix warning signs to containers of raw materials, mixtures, scrap, waste, debris, samples and other products containing asbestos materials. Print the warning labels in letters of sufficient size and contrast as to be readily visible and legible. Include the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

c. Adherence to Prescribed Work Practices. The work processes for asbestos removal or repair are specific to the type of asbestos work protocol. See the appropriate appendix for SOPs for each work protocol:

(1) Appendix B1-B details SOPs for ship's force asbestos work.

(2) Appendix B1-C is the SOP for EART work processes.

d. Proper Stowage and Offloading of Materials Containing Asbestos

(1) **Stowage of Unused Asbestos-Containing Gasket Materials and Packing**. Stow asbestos-containing gasket material and packing (e.g., Garlock® sheets) in double, heavy-duty (six millimeters thickness) plastic bags or other suitable impermeable containers. The storage material must be leak tight. All bags or containers must be provided with standard asbestos labels (paragraph B0104b(3)(b)). Exercise care in order to prevent bags and other containers from rupturing when being transported and stowed.

(2) **Handling, Packaging and Offloading of Removed ACM**. Adequately wet ACM during removal and maintain wet through disposal. Dispose of the wet waste material in double, heavy-duty (six millimeters thickness) plastic bags or other suitable impermeable containers. The waste container must be leak tight. Do not overfill the bags. Provide all bags or containers with standard warning labels per B0104b(3)(b). Distinctly color-code all asbestos waste containers red to ensure easy recognition. Exercise care in order to prevent bags and other containers from

rupturing when being transported to a shore activity for disposal. Accomplish disposal in accordance with appendix L of reference B1-4.

e. Asbestos Medical Surveillance Program (AMSP). The medical department representative (MDR) will determine placement of personnel into the AMSP per reference B1-5. It is possible that all three asbestos protocols may require placement of personnel into an AMSP.

f. Environmental Protection

(1) Repair and removal operations conducted at sea, at a distance greater than 3nm from U.S. shore, are not subject to Environmental Protection Agency (EPA) emissions and reporting standards for asbestos. However, EPA standards for disposal of ACM apply upon return to port. All ACM will be held on station and disposed of ashore per the appropriate EPA requirements.

(2) Ships with qualified teams to perform asbestos repair or removal may do so within 3nm of shore. However, due to inconsistent state-to-state, and increasingly stringent, federal air emissions reporting requirements, each ship is required to contact their TYCOM IHO or REC to determine specific local emissions reporting guidance.

g. Training

(1) Training requirements for personnel performing repair or removal work with ACM are specific to the type of work performed. Each protocol contains the specific requirements for training. The training matrices are as follows:

(a) Training matrix for ship’s force is appendix B1-D.

(b) Training matrix for the EART is appendix B1-E.

(2) In addition to the training requirements detailed in the specific protocols (paragraphs B0107c and B0108c), general training is required for all personnel currently exposed, or with the potential for being exposed to asbestos. All commands are responsible for asbestos training of their personnel. The work-center supervisor should conduct training upon personnel assignment to the work-center. General training shall include:

(a) The health effects/hazards of asbestos;

(b) The association between the use of tobacco products, exposure to asbestos, and the increased risk of developing lung cancer;

(c) Uses of asbestos that could result in an exposure;

(d) Engineering controls and work practices associated with an individual's work assignment;

(e) Purpose, proper use and limitations of protective equipment;

(f) Purpose and description of medical surveillance program;

(g) Description of emergency and clean-up procedures;

(h) Overall review of this chapter and the command's/activity's control plan; and

(i) Posting signs and affixing labels.

h. Recordkeeping. All shipboard asbestos records, including personal and environmental monitoring, quality control and quality assurance, and asbestos related respirator fit testing, shall be transferred to a supporting shore medical activity for permanent retention as required by reference B1-5 following transfer, discharge or retirement of the individual to whom the records refer. The supporting shore medical activity shall establish a file for each ship. If a ship changes homeport, the file will be provided to the new supporting shore medical activity. Upon decommissioning, the supporting shore medical activity shall forward the asbestos record to BUMED. Each individual currently or previously working with asbestos or any other person he or she may designate, shall have access to all such records within 15 days of a written request.

B0105. TYPES OF ASBESTOS WORK PERFORMED ABOARD NAVY SHIPS

For the purposes of this chapter, all work involving ACM has been divided into two protocols. The protocols are:

a. Ship's Force Protocol. This protocol details the requirements and procedures for the repair and removal of materials that contain non-friable ACM (B0107). All afloat commands must comply with the requirements of this protocol.

b. Emergency Asbestos Response Team (EART) Protocol (Formerly the Three Men Emergency Rip-Out Team). This protocol details the requirements and procedures for the minor repair and removal of friable ACM (i.e., asbestos work that can be accomplished using proper glove bag procedures (B0108)).

B0106. WORKPLACE RELEASE CRITERIA

a. Strict adherence to good housekeeping procedures, and dust control measures to minimize release of asbestos fibers during removal/repair of asbestos-containing materials are the most important and effective means of reducing downtime to reoccupy a workspace after asbestos repair or abatement operations.

b. Before a space, where asbestos work was performed, may be released for unrestricted access, the area must be thoroughly cleaned and inspected. Use the checklist found in appendix B1-F for this purpose if required by the protocol.

B0107. PROTOCOL FOR SHIP'S FORCE PERFORMING NON-FRIABLE ASBESTOS MAINTENANCE

a. All Navy ships have non-friable asbestos; therefore, all afloat commands shall comply with the specific requirements of this protocol. The SOPs for the work processes authorized for ship’s force personnel to perform are found in appendix B1-B. Additionally, all afloat commands are required to comply with the general requirements detailed in B0101 through B0106. Ship's force may perform:

(1) Replacement of asbestos-containing gasket/packing material;

(2) Limited asbestos floor tile removal (nine feet^2 maximum); and

(3) Preventive maintenance of brake and clutch assemblies.

b. Ship's Force Protocol Responsibilities

(1) **The safety officer shall:**

(a) Ensure that ship's force personnel performing work under this protocol are trained to accomplish the work described in appendix B1-B.

(b) If applicable (see B0102c NOTE), ensure that documentation, substantiated by laboratory analysis (see B0104a(3)), is obtained for any repair work performed in non-U.S. Navy-operated facility to ensure that no ACM is introduced onto the ship.

(2) **The engineering/repair/aviation intermediate maintenance department heads (as appropriate) shall:**

(a) Provide personnel who work with asbestos with the necessary equipment and protective clothing to perform work per this protocol. Appendix B1-G and appendix B1-H detail the personal protective equipment (PPE) and authorized equipment list (AEL) required for this protocol.

(b) Identify all personnel involved in asbestos repair or removal operations that warrant AMSP consideration, per this protocol (see appendix B1-B, medical surveillance sections), and provide their names to the MDR for consideration for inclusion in the AMSP. Ensure personnel, placed in the AMSP by the MDR, report for medical examinations as required.

(c) Ensure that all asbestos-containing waste materials are collected as required per paragraph B0104d(2) and appendix B1-B and properly stored while awaiting disposal ashore (paragraphs B0104d(1) and (2)).

(d) Ensure that only work described in paragraph B0107 is performed by ship's force.

(e) Ensure that ship's force personnel performing work under this protocol are trained to accomplish the work described in appendix B1-B.

(3) **The medical department representative shall** implement, if applicable, an AMSP, per reference B1-5 for personnel performing preventive maintenance on brake assemblies.

(4) **Division officers shall:**

(a) Notify the safety officer and engineer officer/repair officer prior to performing or authorizing any work that may include the repair or removal of ACM.

(b) Ensure that the workplace is properly cleaned and cleared prior to release for uncontrolled access per B0106 and appendix B1-F. The department head or division officer may designate a leading petty officer (LPO) to accomplish the workplace release inspection.

(c) Ensure that all mandatory training for work covered in this protocol is conducted. Training requirements are detailed in paragraph B0109 and appendix B1-D.

(5) **Work-center supervisors shall** train all hands who work in areas where asbestos-containing materials are present to recognize and report damaged ACM.

(6) **All hands shall:**

(a) Avoid areas posted with asbestos warning signs. Unless authorized, do not enter an asbestos-posted area.

(b) Inform appropriate supervisor of damage to materials covered under this protocol.

c. Training. All personnel currently exposed or with the potential of being exposed to asbestos and their division officer and work-center supervisor shall receive asbestos training prior to, or at the time of their initial assignment.

d. Personal Protective and Engineering Equipment. A matrix containing a general list of personal protective equipment (PPE) for work covered in this protocol is found in appendix B1-G. A detailed authorized equipment list (AEL) of all engineering equipment is found in appendix B1-H.

e. Disposal of Asbestos Waste. Dispose of asbestos waste per paragraph B0104d(2), appendix B1-B, and chapter B3.

B0108. PROTOCOL FOR EMERGENCY ASBESTOS RESPONSE TEAM (EART) (FORMERLY THE 3-MAN EMERGENCY RIP-OUT TEAM)

a. All afloat commands meeting the following criteria shall have an EART to perform emergency repair or replacement of ACM. Each EART team shall consist of a supervisor, a cutter, and a cleaner. Per paragraph B0102, the following afloat commands shall maintain an EART:

(1) Any ship whose keel was laid prior to 1980.

(2) Any ship whose keel was laid on or after 1980, not meeting the exemption for new ships detailed in paragraph B0102c NOTE.

(3) Ships requiring the EART shall comply with all of the general requirements of this chapter (paragraphs B0101 through B0106), the requirements of the protocol for ship's force (section B0107), and the specific requirements of this protocol (paragraphs B0108b through B0108(f)).

(4) The EART may perform:

(a) All work described in the protocol for ship's force per paragraph B0107.

(b) Asbestos repair or removal, limited to small-scale, short-duration repair or maintenance actions. Small-scale, short-duration actions are such tasks as minor repairs of asbestos-containing insulation on pipes. The definition of a minor repair includes removal and reinstallation of less than three linear feet of pipe insulation or less than one square foot (ft^2) of insulation on surfaces other than pipe (an amount that can be done within a glove bag). The standard operating procedure for this action is found in appendix B1-C and reference B1-1.

b. Emergency Asbestos Response Team (EART) Responsibilities

(1) **The safety officer shall:**

(a) Inspect each repair operation involving friable asbestos.

(b) Ensure that the ship has the required equipment to accomplish work per this protocol as defined in reference B1-1 and appendix B1-H.

(c) When asbestos removal or repair operations are completed, approve access to work area using the release criteria per paragraph B0106 and complete appendix B1-F.

(2) **The engineering/repair department head (as appropriate) shall:**

(a) Ensure that a qualified intermediate maintenance activity (IMA) (either afloat or shore) is scheduled to do the work, if asbestos work exceeds the scope of this protocol

(b) Provide personnel who work with asbestos, per this protocol, with the necessary equipment and protective clothing per reference B1-1 and appendix B1-I.

(c) Identify and provide a list of all personnel involved in asbestos operations to the medical department representative for consideration for entry into the AMSP.

(d) Ensure that all asbestos-containing waste materials are collected, stowed and disposed of as required by paragraph B0104d(2) and chapter B3.

(e) Ensure personnel are trained, and training is documented in the member's service record. Training requirements for this protocol are located in appendix B1-E.

(f) If a repair or removal of ACM, involving an IMA is scheduled, interface with the IMA personnel and attend the pre-work brief per paragraph B0109(c).

(3) **The division officer of the workspace where asbestos work is being conducted shall** attend the asbestos pre-work brief if required asbestos work exceeds the scope of this protocol (paragraph B0108a(4)(b) and appendix B1-J).

(4) **The MDR shall** implement an AMSP, per reference B1-5.

c. Training

(1) All members of the EART shall be graduates of Emergency Asbestos Response Team Course, CIN A-760-2166. (See appendix B1-E).

(2) This training shall be documented in the member's service record upon completion.

d. Personal Protective Equipment. Personnel engaged in work per this protocol, shall wear the protective clothing and equipment discussed in the appendix B1-I. A list of equipment and tools can be found in appendix B1-H.

NOTE:

Critical watchstanders, personnel who must remain in the immediate area, due to watch standing requirements, where asbestos repair or removal is being conducted, are required to wear the same PPE as those personnel performing the asbestos work, and at least a half-mask, air-purifying respirator with a filtering cartridge.

e. Disposal of Asbestos Waste. Dispose of asbestos waste per appendix B1-C and Chapter B3.

f. Medical Surveillance Requirements. Per references B1-1 and B1-5, a list of EART personnel shall be submitted to the medical department for consideration for entry into the command's AMSP.

CHAPTER B1

REFERENCES

B1-1. Naval Ship's Technical Manual, Chapter 635, Thermal Fire and Acoustic Insulation

B1-2. Title 29 Code of Federal Regulations (CFR), section 1915.1001, Asbestos Exposure in all Shipyard Employment Work

B1-3. Title 29 Code of Federal Regulations (CFR) section 1910.1001, (not required on board ship, but a pertinent reference)

B1-4. OPNAVINST 5090.1B

B1-5. NEHC Technical Manual TM OM-6260, Occupational Medical Surveillance Procedures Manual and Medical Matrix Edition 7.

B1-6. NEHC Technical Manual TM 6290.91-2B, Industrial Hygiene Field Operations Manual

Appendix B1-A

ASBESTOS INSULATION BULK SAMPLE COLLECTION AND SUBMISSION PROCEDURE

To determine if the thermal insulation to be handled for repair or rip-out is indeed asbestos, a sample of the material must be submitted to the industrial hygiene department of any NAVENPVNTMEDU, naval medical center, naval hospital or naval medical clinic, or to the IHO/safety officer aboard a tender for immediate analysis. Following are procedures for collecting a sample suspect asbestos material:

a. Restrict access within 10 feet of the area in which sampling is to be done to only personnel wearing a National Institute for Occupational Safety and Health (NIOSH)-approved half-mask air-purifying respirator equipped with high efficiency filtering cartridges/filters. Respiratory protection shall be worn by personnel collecting bulk samples of insulation.

b. Secure supply and exhaust ventilation systems in the area.

c. Lightly moisten the cut area with water using a plastic water spray bottle to control asbestos dust while cutting out bulk insulation samples. Adjust the spray to produce a mist, not a straight stream.

d. While cutting into the lagging, hold a disposable plastic bag under the area for collection of any debris.

e. Only a small sample is required for analysis. Carefully cut an approximate 1/2-inch (or quarter size) diameter core through the outer lagging cloth/paste and through the underlying insulation down to the covered metal surface. For soft insulation material, a knife may be appropriate. For hard preformed insulation, a chisel or sharpened screwdriver may be used. A knife is not safe for use with hard preformed insulation since the increased force necessary to penetrate the insulation makes accidental hand contact with the exposed blade a real probability. The ideal coring device is a sharpened steel punch that can be driven into the preformed insulation. Some Navy shipyards have locally fabricated stainless steel borers, modeled after cork borers but substantially strengthened,

for this purpose. Whatever device is used for sampling must be cleaned after each sample to prevent cross-contamination of samples. For boring tools, cleaning with a wire bore-brush followed by a water wash is recommended. A sample should be submitted for every 10 feet of lagging provided that the material appears to be the same. If there are breaks, seams, or changes in the direction of the lagging, a sample for each section is required. A sample for each type of tile and type of gasket or packing should also be submitted.

f. Using forceps, a spatula, some other instrument or a gloved hand, place the insulation in a four by four-inch polyethylene interlocking seal bag. Label the exterior of the bag as required in paragraph B0104b(3)(b). The bag shall be marked as to location of the sample, command, sampler's name, date of sample and any sample number, if applicable. Fold and place the labeled bag inside another four by four-inch polyethylene interlocking seal bag.

g. After collecting the sample, cover the exposed insulation with duct tape, place respirator in a plastic bag. Respirators should be cleaned per chapter B6. Cartridges and all rags or material used to wipe down the respirator and/or tools should be immediately disposed of as asbestos waste per paragraph B0104d(2). Wash hands, tools and sprayer.

h. The collected sample(s) should be submitted by mail or hand-delivered using the Navy Environmental Health Center industrial hygiene sample submission form. This form is found in reference B1-6.

i. Upon receipt, the sample will be analyzed using polarizing light and dispersion staining microscopy, results recorded on the DD 1222 and returned to the requesting command. A return phone call of results may also be arranged.

Appendix B1-B

STANDARD OPERATING PROCEDURES FOR SHIP'S FORCE PROTOCOL

Replacement of Asbestos-Containing Gasket/Packing Material

1. **Scope.** This standard operating procedure covers the repair and/or replacement of asbestos-containing gaskets or packing in pumps or valves and the replacement of asbestos-containing gaskets in pipes.

2. **Stowage.** Store all quantities of asbestos-containing materials (ACM) in sealed impermeable containers or plastic bags and labeled as asbestos-containing material until needed for repair/replacement per paragraph B0104d(1). Manufacturer's warning labels noting asbestos content are sufficient only if the materials are not removed from that packaging. Repackaged, unlabeled materials must have new labels applied. Similarly stow waste asbestos-containing materials for shore offload. Post storage areas with asbestos warning signs to advise personnel of asbestos presence per paragraph B0104b(3)(b).

3. **Personal Protective Equipment**. No personal protective equipment is required for this standard operating procedure.

4. **Procedures**

NOTE:

Do not consume food or beverages, chew gum or tobacco, smoke, or apply cosmetics during asbestos-containing gasket/packing maintenance operations.

a. Use an impermeable drop cloth below the work area.

b. Thoroughly wet the gasket or packing material with water prior to removing. For gaskets, wetting should be accomplished after the joint is loosened.

c. Avoid cutting, abrading, or breaking the gasket or packing material. Remove the gasket or packing material intact, if possible.

d. Place wet gasket or packing material into a disposal container and keep it wet until transferred to a closed receptacle.

NOTE:

A sealable, suitably sized plastic bag may be used for temporary stowage until transferred to an appropriately labeled container.

e. Remove any residue by scraping using wet methods.

NOTE:

Do not use power tools to remove gasket or packing residue.

f. Dispose of gasket or packing material and drop cloth as ACM.

g. Replace all asbestos-containing materials with approved asbestos-free material, if available. If replacement material contains asbestos, prior to cutting new gasket or packing, thoroughly wet gasket or packing material; then cut. Once cut gasket or packing is in place, dispose of residual debris, continuing to use wet methods. Wipe up debris with damp rags. Gasket or packing material that is still useable shall be placed in asbestos-labeled container/bag and properly secured.

NOTE:

Wire-wound (flexitallic) gaskets with asbestos between rings need not be wetted prior to installation.

h. At the conclusion of work, either use a cleaner with a high efficiency, particulate air (HEPA) filter to vacuum all dusty surfaces or wet and wipe them down with a damp rag. Dispose of damp rag(s) as ACM.

i. Clean and decontaminate all tools with damp rags. Dispose of rags as ACM.

j. Personnel shall wash their hands upon completion of gasket or packing repairs/replacements and before eating and drinking, chewing gum or tobacco, or applying cosmetics.

5. **Offload.** Offload the replaced gasket or packing material and any scrap materials as ACM. Handle all rags as asbestos waste. Handle drop cloths as ACM. Once asbestos waste is collected, place in red asbestos labeled bag and thoroughly wet all wastes. Tape-off the bag and place in second approved and appropriately-labeled bag (double bag). Seal up the second bag with tape and place in ACM-marked barrel/container for offload. Seal all bags with a "J" or goose-neck seal. Properly label the waste bag per all local requirements.

6. **Medical Surveillance.** Medical surveillance is not required for this operation.

7. **Training.** All personnel performing replacement of asbestos-containing gasket/packing material shall be trained on this standard operating procedure prior to performing any asbestos work. Accomplish training per paragraph B0109 and appendix B1-D. Training shall be accomplished as follows:

For ships with no Emergency Asbestos Response Team (EART), this training shall be accomplished by the safety officer or engineering officer as on-the-job training using the standard operating procedures in this appendix.

For ships with an EART, this training shall be accomplished by the safety officer or engineering officer, or a member of the EART that has successfully completed "Emergency Asbestos Response Team" (A-760-2166), as on-the-job training using the SOPs in this appendix.

This training shall be documented in the member's service record upon completion.

Appendix B1-B

STANDARD OPERATING PROCEDURES FOR SHIP'S FORCE PROTOCOL

Limited Asbestos Floor Tile Removal

1. **Scope.** This standard operating procedure (SOP) covers removal of a limited amount of asbestos-containing floor tile. Limited amount is defined as nine square feet of tile (approximately nine tiles). The intent of this SOP is operational; not to improve the aesthetics of a space.

2. **Stowage.** Store all quantities of asbestos-containing materials (ACM) in sealed impermeable containers or plastic bags and labeled as asbestos-containing material until needed for repair/replacement (see paragraph B0104d(1)). Manufacturer's warning labels noting asbestos content are sufficient only if the materials are not removed from that packaging. Repackaged, unlabeled materials must have new labels applied. Post storage areas with asbestos warning signs to advise personnel of the presence of asbestos per paragraph B0104b(3)(b).

3. **Personal Protective Equipment**

a. **Respiratory Protection**. No respiratory protective equipment is required for this standard operating procedure.

b. **Gloves**. Wear disposable gloves for this action. Surgical gloves are prohibited.

4. **Procedures**

a. Cordon off an area around the floor tile to be removed using rope or tape and appropriate signs.

NOTE:

Do not consume food or beverages, chew gum or tobacco, smoke, or apply cosmetics in the work area during maintenance operations.

b. Remove the floor tiles from the deck using a putty knife, spatula, or other manual, hand-operated tool. Do not use power

tools to remove floor tiles or mastic. Heat guns may be used to remove tiles. Avoid breaking the tiles, if possible.

c. Place removed floor tiles into a suitably colored and marked container.

d. If mastic will be removed from the deck, remove by scraping using wet methods. Mastic remover may be required to remove all mastic. Ensure mastic remover is authorized by checking the Ships Hazardous Material List (SHML) or through written commanding officer authorization.

e. Offload tile and mastic as ACM.

f. Use non-asbestos-containing replacement tiles. If replacement tiles contain asbestos, dispose of tile residue and debris as ACM. Wipe up debris with damp rags. Tile material that is still useable shall be replaced in asbestos-labeled container/bag and properly secured (see paragraph B0104d(1)).

g. At the conclusion of work, either HEPA vacuum all dusty surfaces or wet and wipe them down with a damp rag. Dispose of damp rag(s) as ACM.

h. Remove gloves and dispose of as ACM.

i. Clean all tools and decontaminate with damp rags. Dispose of rags as ACM.

j. Personnel shall wash their hands upon completion of tile/mastic removal action and before eating and drinking, chewing gum or tobacco, or applying cosmetics.

5. **Offload.** Dispose of removed tile and mastic material and any scrap materials as ACM. Handle all rags, disposable clothing, and respirator cartridges as ACM. Once all asbestos waste is collected, place in an impermeable ACM-labeled bag and thoroughly wet waste. Tape-off the bag and place in second approved and appropriately-labeled bag (double bag). Seal up the second bag with tape and place in ACM-marked barrel/container for offload. Seal all bags with a "J" or goose-neck seal. Properly label the waste bag per B0104b(3)(b).

6. **Medical Surveillance.** Medical surveillance is not required for this type of operation.

7. **Training.** All personnel performing replacement of limited amounts of asbestos-containing floor tile shall be trained on this standard operating procedure prior to performing the operation. Accomplish training as follows:

For ships with no EART, this training shall be accomplished by the safety officer or engineer officer as on-the-job training using the Standard Operating Procedures in this appendix.

For ships with an EART, this training shall be accomplished by the safety officer or engineering officer, or a member of the EART that has successfully completed "Emergency Asbestos Response Team" (A-760-2166), as on-the-job training using the SOPs in this appendix.

This training shall be documented in the member's service record upon completion.

Appendix B1-B

STANDARD OPERATING PROCEDURES FOR SHIP'S FORCE PROTOCOL

Preventive Maintenance on Brake Assemblies

1. **Scope.** This standard operating procedure covers brake planned maintenance system (PMS) on anchor windlass, capstan, and weight handling equipment (hoist, cranes, conveyors, elevators, winches, chainfalls, and come-a-longs) in which brakes are made of asbestos-containing materials.

2. **Stowage.** Store all quantities of ACM in impermeable, sealed containers or plastic bags and labeled as ACM until needed for repair/replacement. Manufacturer's warning labels noting asbestos content are sufficient only if the materials are not removed from that packaging. Repackaged, unlabeled materials must have new labels applied. Post storage areas with asbestos warning signs to advise personnel of the presence of asbestos.

3. **Personal Protective Equipment**

a. **Respiratory Protection.** Wear a half-mask air-purifying respirator equipped with high efficiency filtering cartridges for this operation. Do not wear single-use disposable respirators. Ensure that the Respiratory Protection Manager (RPM) is fully involved in the selection and fit testing of all respirators.

NOTE:

The command shall train, fit test and ensure that all personnel have been medically cleared to wear a respirator before allowing any personnel to don a respirator.

b. Wear disposable impermeable coveralls (Tyvek® Type II or equivalent) for this action. Seal the coveralls at the wrists, ankles, and neck. Wear disposable gloves to handle asbestos brake assemblies and tape gloves at the wrists.

4. **Procedures**

a. Cordon off the area and hang appropriate signs identifying the asbestos hazard.

NOTE:

Do not consume food or beverages, chew gum or tobacco, smoke, or apply cosmetics in the work area during maintenance operations.

b. During brake maintenance activities, control access to the space in which maintenance is being performed. This may require posting a Sailor at each entrance/exit to the space.

c. Use an impermeable drop cloth in the work area to assist in clean-up.

d. Do not use any equipment or perform any operation that liberates fibers or creates dust (e.g., dry sweeping or using an air hose in the work area).

e. Before commencing work, either wet the area in which the brake assembly is located or vacuum the area or both, whichever will be required to eliminate asbestos fibers or dust in the area. Use a high efficiency particulate air (HEPA) filter vacuum to ensure the area is thoroughly clean and good housekeeping is maintained.

CAUTION:

Do not use low pressure air to blow dust out of the brake assembly area.

f. Commence preventive maintenance in brake assembly area including repair/replacement of asbestos-containing components. During maintenance, take care not to use power tools that may generate dust. If a power tool must be used, consult either the shipboard assistant safety officer (if aboard)/industrial hygiene officer for further guidance.

g. At the conclusion of work, either HEPA vacuum all dusty surfaces or wet and wipe them down with a damp rag. Dispose of damp rag(s) as ACM.

h. Place all clothing removed in the reverse order it was applied. Dispose of coveralls as ACM.

i. Remove respirator last. Treat cartridges as ACM. The respirator face-piece shall be decontaminated and returned to proper storage.

j. Ensure all tools are cleaned and decontaminated with damp rags. Dispose of rags as ACM.

k. Personnel shall wash their hands upon completion of maintenance action and before eating and drinking, chewing gum or tobacco, or applying cosmetics.

l. Upon completion of all work, the safety officer shall inspect and clear the area using appendix B3-F prior to allowing general access to the space.

5. **Offload.** Offload the old brake pads and any scrap materials as ACM. Handle all rags, disposable clothing, respirator cartridges, and drop cloths as asbestos waste. Once all asbestos waste is collected, place in impermeable, appropriately-labeled bag and wet thoroughly. Tape off the bag and place in second approved and appropriately labeled bag (double bag). Seal up the second bag with tape and place in ACM-marked barrel/container for offload. Seal all bags with a "J" or goose-neck seal. Properly label the waste bag.

6. **Medical Surveillance.** Medical surveillance may be required for this asbestos operation. Placement of personnel into the asbestos medical surveillance program (AMSP) is based on past history and/or current exposure or potential exposure to asbestos. Placement into the AMSP is dependent upon industrial hygiene sampling data, and the determination of the medical department representative (MDR).

7. Training. All personnel performing brake assembly preventive maintenance shall be trained on this standard operating procedure prior to performing the operation. Accomplish training as follows:

For ships with no EART, this training shall be accomplished by the safety officer or engineering officer as on-the-job training using the Standard Operating Procedures in this appendix.

For ships with an EART, this training shall be accomplished by the safety officer or engineering officer, or a member of the EART that has successfully completed "Emergency Asbestos Response Team" (A-760-2166), as on-the-job training using the SOPs in this appendix.

This training shall be documented in the member’s service record upon completion.

Appendix B1-C

STANDARD OPERATING PROCEDURES FOR EMERGENCY ASBESTOS RESPONSE TEAM (EART) PROTOCOL

1. General

This SOP covers the emergency repair of asbestos-containing lagging. The intent of this SOP is for emergency asbestos lagging repair work, and is not for general maintenance or normal repair of asbestos lagging which must be conducted by an intermediate maintenance activity (IMA) or contractor personnel.

2. Personal Protective Equipment

a. **Respiratory Protection**. A half-facepiece, continuous flow supplied air respirator shall be used.

NOTE:

All personnel wearing respiratory protective equipment shall be trained, fit tested, and medically cleared before donning a respirator.

b. **Gloves**. Wear disposable gloves for this action. Surgical gloves are prohibited as an outer glove. Surgical or patient exam gloves may be worn as an inner glove during removal operations.

c. **Disposable Sacksuits**. Wear impermeable coveralls (e.g., Tyvek® or equivalent disposable sacksuits) with integral booties and hood.

d. **Boots**. Wear rubber slip-resistant booties over the Tyvek® booties.

e. **Tape**. Duct tape shall be applied to wrists, ankles, and around the respirator and hood opening. While other tapes may work, duct tape is recommended due to its superior adhesive properties.

3. **Procedures**

a. Obtain the commanding officer's permission to remove asbestos for emergency repair.

b. Brief the EART.

c. Secure or redirect ventilation as necessary.

d. Cordon off the area around the asbestos lagging to be removed using rope or tape and appropriate signs.

e. Suit up team in required PPE ensuring that all openings are taped shut.

NOTE:

Do not consume food or beverages, chew gum or tobacco, smoke, or apply cosmetics during asbestos emergency repairs.

f. Use an impermeable drop cloth (polyethylene) below the work area.

g. Glove bag procedure

(1) Place any tools, encapsulant, etc., into glove bag before beginning securing operations.

(2) Attach glove bag to area being worked. Be sure to securely close all seams on and around the glove bag with duct tape.

(3) The glove bag should be tested for leaks using smoke tubes. Smoke tubes used in respiratory fit test procedures are ideal for this function. If leaks are found, secure with additional duct tape.

(4) Ensure HEPA vacuum and amended water sprayer are attached to appropriate points on the glove bag and taped to prevent leaks. When using HEPA vacuum to obtain negative pressure in a glove bag, it will be extremely difficult to maintain a negative pressure and accomplish work simultaneously. It is recommended that negative pressure be used only upon the

completion of the job, and when the glove bag is being removed from the repair site.

h. Thoroughly wet lagging with the amended water prior to and during the removal operation.

i. Remove the lagging as intact as possible.

j. Clean bare pipe and seal off exposed insulation using approved encapsulation methods.

k. Wash and wipe down inside of glove bag from top to bottom to remove potential fiber contamination.

l. Remove any recoverable tools by holding onto them and pulling them out. The glove should now be inside out. Twist the glove and seal with duct tape. Cut glove from glove bag with scissors or sharp knife, and hold for later decontamination.

m. Turn on HEPA vacuum and twist glove bag in the middle below the vacuum hose. Seal with duct tape and cut in two, cutting in the middle of the tape. Place this into an approved and appropriately labeled disposal bag.

n. Disconnect rest of glove bag and place into asbestos disposal bag.

o. Replace all asbestos-containing lagging with non-asbestos containing lagging.

p. Either HEPA vacuum and/or wet and wipe any dusty or potentially contaminated surfaces with a damp rag. Dispose of rags as ACM.

q. Clean and decontaminate all tools with damp rags. Dispose of rags as ACM.

r. Pick up drop cloth and dispose of as ACM.

s. Remove rubber booties and decontaminate with wet rags. Dispose of rags as ACM.

t. Remove the coveralls and dispose of as ACM. It is recommended that the arms be turned inside out, then roll the

suit down the body, and pull the legs inside out. This keeps contamination on the suit and away from the body.

u. Remove gloves by turning them inside out, and dispose of as ACM.

v. Remove respirator and decontaminate using warm soapy water.

w. Personnel shall shower upon completion of asbestos removal action and before eating and drinking, chewing gum or applying cosmetics.

4. **Disposal.** Dispose of glove bag, PPE, any scrap materials, all rags, and drop cloths as ACM. Once ACM is collected, place in an impermeable bag and thoroughly wet all wastes. Tape off the bag and place in a second approved and appropriately labeled bag (double bag). Seal up the second bag with tape and place in asbestos waste barrel/container for offload. Seal all bags with a "J" or goose neck seal.

5. **Medical Surveillance.** Medical surveillance is required for the EART.

6. **Training.** Personnel designated to be on the EART shall be trained through the two-day Emergency Asbestos Response Team (A-760-2166) offered through the Naval Occupational Safety and Health, and Environmental Training Center (NAVOSHENVTRACEN).

7. **Conflicts.** Application of asbestos-control requirements shall not be allowed to compromise the requirements for control of radioactive contamination in naval nuclear-powered ships as contained in NAVSEA 0389-LP-028-8000, Radiological Controls for Shipyards. Should conflicts be discovered, submit a proposed resolution to COMNAVSEASYSCOM (SEA 08).

Appendix B1-D

TRAINING REQUIREMENTS FOR SHIP'S FORCE PROTOCOL

Navy Personnel Training Requirement	Citation	Course Title/Training Required	Requirement	Formality	Resource for Training	Length of Training	Periodicity
All personnel performing non-friable asbestos work: • Limited asbestos-containing floor tile removal • Asbestos-containing gasket replacement • Asbestos-containing brake assembly maintenance	B0104g	Asbestos removal procedures detailed in Appendix B1-B	Mandatory	Informal	For ships with no EART (**See NOTE [1]**) For ships with an EART (**See NOTE[2]**)	TBD	On-the-job training

Navy Personnel Training Requirement	Citation	Course Title/Training Required	Requirement	Formality	Resource for Training	Length of Training	Periodicity
All personnel performing preventive maintenance on brake assemblies	Appendix B1-B, chapter B6	Respirator fit-testing, selection, and maintenance	Mandatory	Informal	RPM	TBD	Prior to donning a respirator, and annually thereafter

Detailed information regarding class schedules, quotas, etc. can be found on the NAVOSHETC website at http://www.safetycenter.navy.mil/training

NOTE [1] **For ships with no Emergency Asbestos Response Team (EART),** this training shall be accomplished by the safety officer or engineering officer as on-the-job training using the Standard Operating Procedures in appendix B1-B.

NOTE [2] **For ships with an EART,** this training shall be accomplished by the safety officer or engineering officer, or a member of the EART that has successfully completed "Emergency Asbestos Response Team" A-760-2166, as on-the-job training using the Standard Operating Procedures in appendix B1-B.

Appendix B1-E

TRAINING REQUIREMENT FOR ASBESTOS-RELATED WORK

Emergency Asbestos Response Team

Navy Personnel Training Requirement	Citation	Course Title/Training Required	Requirement	Formality	Resource for Training	Length of Training	Periodicity
EART Personnel performing glove bag asbestos removal	B0114	"Emergency Asbestos Response Team" A-760-2166	Mandatory	Formal Classroom	NAVOSHEN VTRACEN	2 days	Initially. No refresher required.
EART Personnel performing glove bag asbestos removal	Appendix B1-C chapter B6	Respirator fit-testing, selection, and maintenance	Mandatory	Informal	RPM	TBD	Prior to donning a respirator, and annually thereafter

Detailed information regarding class schedules, quotas, etc., can be found on the NAVOSHETC website at http://www.safetycenter.navy.mil/training.

Appendix B1-F

WORKPLACE RELEASE CHECKLIST

Upon completion of an asbestos repair or removal, use this checklist to inspect the asbestos work area. This inspection is a critical part of the asbestos removal operation. Failure to satisfactorily complete the inspection, which includes correction of all deficiencies observed, may result in asbestos exposure long after the project is completed. Complete this inspection prior to disestablishment of the asbestos work area. The department performing the asbestos work must retain a copy of the checklist with other records of the removal.

Provide the inspector with a standard flashlight equipped with fresh batteries, a complete set of personal protective equipment, including respirator (where applicable), required for entry into the asbestos work area. Do not begin the inspection until all surfaces within the regulated area are dry and visibly cleared of dust and debris to ensure that any contamination can be observed.

Inspector: _____ Last 4: (SSN) _____

Asbestos Removal Team Supervisor: _____

Date: _____ Time: _____

Area Inspected: _____

Ship's Name: _____ Hull No.: _____

		SAT	UNSAT
1	**All** surfaces within the regulated area are free of visible dust and debris. Use mirrors, flashlights, and other tools to accomplish this inspection. Inspect cable ways to the extent possible without disturbing the wires.		
2	Asbestos work area is still secured and properly posted.		
3	All asbestos waste is properly sealed in leak tight containers that are labeled with proper warning label (paragraph B0104b(3)(b).		
4	All asbestos containing material that was to have been removed has been removed.		
5	Surfaces exposed by the asbestos removal operation are free of **all** visible contaminants, rust, and scale. If rust and scale are present and can not be removed they must be encapsulated. This inspection requires that the exposed surface be disturbed to see if there is any residue. This may be accomplished with a screwdriver, scratch awl, or other pointed device.		
6	IMA protocol only – The project is considered complete if samples collected are no greater than 0.01 f/cc or background, whichever is greater, as measured prior to starting the non-emergency asbestos abatement, but never greater than 0.1 f/cc.		

I certify that the inspection is satisfactory and the regulated area may be released from asbestos controls for unrestricted access.

Signature: _____ Date/Time: _____

Signature Authority:

EART protocol: Safety officer signature required
Ship's force protocol: Department head or division officer

Appendix B1-G

PERSONAL PROTECTIVE AND SPECIAL EQUIPMENT

Ship's Force Performing Non-Friable Asbestos Repair and Removal

Operation	Required Personal Protective Equipment				Special Equipment
	Hood	Respirator	Gloves	Tyvek® (or equivalent coveralls)	HEPA Vacuum
Limited Floor Tile/Mastic Removal			√		optional
Brakes/Clutch Assemblies	√	√*	√	√	√
Replacement of Gaskets/ Packing materials					optional

* For work covered by this protocol, the worker will wear a half-face, air-purifying respirator with high efficiency filtering cartridge. The RPM will determine the type of respirator required for each work process.

Type, quantity, specific ordering information for this PPE is found in appendix B1-H

Gloves: Use medium weight rubber gloves with a thin cotton "under glove" to absorb perspiration.

See appendix B1-H for national stock numbers (NSNs) for this and all associated PPE and equipment.

NOTE:

Critical watchstanders, personnel who must remain in the immediate area, due to watch standing requirements, where asbestos repair or removal is being conducted, are required to wear the same PPE as those persons performing the asbestos work.

Appendix B1-H

AUTHORIZED EQUIPAGE LIST FOR ASBESTOS WORK PROTOCOLS

AEL 2-330024045

NOMENCLATURE	NSN	U/I	SHIP'S FORCE	EART
Bag, Disposal Red Plastic 55 GAL Cap	8105-01-086-5053	BX	1	1
Cooling Assembly	4240-01-083-3399	KT	0	3
Ambient Air Breathing Apparatus, Electric	4310-01-106-4121	EA	0	0
Warning Signs	9905-01-345-4519	EA	OAR*	OAR*
Coveralls, Disposable, sacksuit w/shoes and hood, Large	8415-01-092-7531	BX	0	1
Coveralls, Disposable, sacksuit w/shoes and hood, X-Large	8415-01-092-7532	BX	0	1
Glove Inserts, Surgeons	6515-01-354-3157	PG	10	20
Gloves, Clean Room, Medium	8415-01-399-0704	PG	10	20
Gloves, Clean Room, Large	8415-01-399-0702	PG	10	20
Overshoes, Rubber Medium	8430-00-421-7487	PR	0	6

NOMENCLATURE	NSN	U/I	SHIP'S FORCE	EART
Overshoes, Rubber Large	8430-00-421-7488	PR	0	6
Sprayer, Insecticide	3740-00-191-3677	EA	0	1
Spray Bottle, Plastic	8125-00-488-7952	EA	4	4
Duct Tape	5640-00-103-2254	RO	0	20
Plastic Sheeting, 6 mil	8135-00-579-6486	RO	0	2
Paper Towels, Absorbent	7920-00-823-9772	BX	1	2
Finger Grip Saw	5110-00-570-6896	EA	0	2
Keyhole Saw	5110-00-142-5010	EA	0	2
Nylon Brush	7920-00-324-2746	EA	0	2
Scouring Pad	7920-00-753-5242	EA	0	3
EAB Modification Kit for Submarines	4240-01-077-5994	EA	0	6
Ventilation Smoke Tube Kit (for glovebags)	MSA 458481	EA	0	1
Glass Smoke Tubes (10/PKG)	MSA 5645	PG	0	2

Negative Air Unit, Abatement Technologies, HEPA-Aire 1000, Part Number H1000V Replacement Parts: H1001 Primary Filter Pads, 30/cs. H1002-12 Pleated Secondary Filters, 12/cs. H1010E Wood Frame 99.97% HEPA, 1/cs.	Open Purchase: Abatement Technologies 3305 Breckenridge Blvd. #118 Duluth, GA 30136 1-800-634-9091	EA	0	0
Magnehelic Gauge	6685-00-910-6964	EA	0	0
HEPA Vacuum: Hako Minuteman Wet/Dry, 15-gallon capacity; C83985-05/-16. Replacement parts: *800317 Crush-proof Hose *800015 Wand (Operator's Handle) *800070 Gulper Tool *800024 Round Dust Brush *800116 Swivel Connector *110121PKG Impact Filters (12/Pkg.) *805037PKG Plastic Bags (12/Pkg.) *805038PKG Filter Protectors (12/Pkg.) 110010 HEPA Filter Replacement (85" Water Lift) Lid Assembly	GSA Contract Number: GS-07F-8158B	EA	0	0

110001 HEPA Filter Replacement (105"/130" Water Lift) Filter Replacement *Note: Items with an asterisk (*) are included as part of No. 800109, Wet/Dry Tool Kit 30B. **OR**				
HEPA Vacuum: Nilfisk VT60 Wet/Dry, 5 to 15-gallon capacity; *01799350/375101 Replacement Parts: *01722601 Impact Filter (washable) *017383 Main Filter Finger Tubes (washable) *616821 Microfilter *017840 Trolley Assembly *01727631 HEPA Cartridge *017196 10-foot Plastic Hose (1.5") *017193 Double-Curved Aluminum Wand *017192 14-inch Wheeled Floor Nozzle *0171941 3-inch Aluminum Dust Brush *017195 11-inch Plastic Crevice Nozzle	GSA Contract Number: GS-07F-8356C	EA	0	0

*017191 Container Polyliners (25/Pkg.) *Note: Items with an asterisk (*) are included as part of item number 01799350/375101.				

NOTE: See Appendices B1-I for PPE requirements for Ship's Force Protocol and B1-K for requirements for PPE requirements for Emergency Asbestos Response Team Protocol.

***OAR – Order As Required**

Appendix B1-I

PERSONAL PROTECTIVE AND SPECIAL EQUIPMENT

Emergency Asbestos Response Team Performing Glove Bag ACM Removal

Operation	Required Personal Protective Equipment						Special Equipment			
	Tyvek® or Equivalent									
	Coveralls	Hood	Booties	Z-87 Safety Goggles	Respirator	Gloves	HEPA Vacuum	Cooling Assembly	Finger Grip Saw	Keyhole Saw
Glove Bag Procedures ONLY										
<3 linear feet of pipe insulation or 1 square foot of insulation on surfaces other than pipes	√	√**	√**	√	√*	√	√	√	√	√

* The RPM will determine the type of respirator required for each work process. If the concentration of airborne asbestos is unknown, use a full face, continuous flow supplied air respirator. The self-contained breathing apparatus (SCBA) respirator meets this requirement.

** Type II Tyvek® (or equivalent) coveralls have hood and booties attached, therefore, separate hoods and shoe coverings are not required with this PPE.

Type, quantity, specific ordering information (NSN information) is found in appendix B1-H. Information contained in appendix B1-H is taken from AEL 2-330024045.

Gloves: Use medium weight rubber gloves with a thin cotton "under glove" to absorb perspiration.

See appendix B1-H for the national stock numbers (NSNs) for this and all associated PPE and equipment.

NOTE:

The proper use of protective clothing requires that all openings be closed and that garments fit snugly about the neck, wrists, and ankles. Accordingly, tape the wrist and ankle junctions, as well as the collar opening on the outer disposable coveralls to prevent contamination of skin and underclothing without restricting physical movement.

NOTE:

Critical watchstanders, personnel who must remain in the immediate area, due to watchstanding requirements, where asbestos repair or removal is being conducted, are required to wear the same PPE as those personnel performing the asbestos work, and at least a half-mask, air-purifying respirator with a high efficiency filtering cartridge.

FOR SUBMARINES

Personnel performing asbestos work shall wear an emergency air breathing (system) (EAB) modified to replace the demand regulator (see AELs 2-330023-47, 2-33034070, and 2-330024045 for EAB kit information). Watchstanders in the same compartment as the work being performed may wear an unmodified EAB mask.

Appendix B1-J

ASBESTOS REPAIR OR REMOVAL PRE-WORK BRIEF

To be conducted jointly between the IMA and the vessel receiving asbestos repair or removal support. Prior to conducting asbestos repair or removal operations on a ship, the IMA will conduct a pre-work briefing with the engineering officer, safety officer, division officer and/or work-center supervisor of the department of the ship receiving the asbestos work.

The briefing will include at least the following:

1. A listing of all spaces that will be affected by the asbestos work. These will include the spaces used for shower facilities if they are required.

2. A discussion of the asbestos controls that will be used to accomplish the work. This will include:

a. The exact location of the asbestos regulated area boundaries.

b. The requirement to secure ship’s ventilation in the area of the removal operation and its effect on the ship and personnel.

c. Disposal of any waste generated and who will be responsible for its disposal. Normally this will be the receiving ship.

d. Air monitoring that will be accomplished and how the results of the general area monitoring will be conveyed to the receiving ship.

3. A discussion of any vital watchstanders the receiving ship may require to remain in the asbestos regulated area. The IMA and the receiving ship will mutually agree to the need for these watchstanders.

4. The planned times that the asbestos area will be isolated and entry restricted.

Any additional aspects of the planned work that either party feels should be discussed.

CHAPTER B2

HEAT STRESS

B0201. DISCUSSION

a. This chapter establishes Navy policy and procedures for the control of personnel exposure to heat stress and applies to all ships, including submarines. Ships shall not expose personnel to excessive heat stress and shall provide a shipboard work environment that minimizes the probability of such exposure.

b. This chapter applies to heat stress control and personnel protection for most shipboard operating conditions. It does not apply for the determination of heat exposure limits specifically for personnel wearing layered or impermeable clothing such as chemical/biological warfare clothing, fire fighting protective clothing or ensemble, or chemical protective clothing (worn for use during clean-up of hazardous material spills) or any type of body cooling garment or device.

c. Heat stress is any combination of air temperature, thermal radiation, humidity, airflow, workload, and health conditions that may stress the body as it attempts to regulate body temperature. Ships can determine maximum exposure limits for various environmental conditions and individual work rates. Adherence to these maximal heat exposure guidelines can prevent or reduce the adverse physiological effects of heat stress. Sufficient recovery time in a cool environment will help reverse the harmful effects of heat stress. Recognizing personnel heat stress symptoms and obtaining prompt medical attention for affected persons is an all hands responsibility.

d. To obtain accurate and reliable data on heat stress conditions, ships shall conduct heat stress surveys to record dry-bulb (DB), wet-bulb (WB), and globe temperature (GT) readings. They must take DB and WB temperature with both thermometers shielded from radiant heat and the WB also must be properly ventilated to determine the effects of airflow. Measurement is accomplished by means of a globe thermometer that provides a value representing radiant and convection heat transfers to or from the body. The Navy uses either a wet-bulb-

globe temperature (WBGT) meter or an automated heat stress system (AHSS) to measure each of the above temperatures. The WBGT index is calculated using dry bulb, wet-bulb, and globe temperature. The WBGT index and physical exertion level are used determine how long an individual may be exposed safely to heat stress conditions. Appendix B2-A presents this information in a columnar format by means of the physiological heat exposure limits (PHEL) tables.

e. While heat stress conditions can occur anywhere on board a ship, machinery spaces, laundries, sculleries, galleys, incinerator rooms, flight decks, and steam catapult rooms are the most likely to have conditions that may cause heat stress. Conditions of elevated heat stress include operations in hot and humid climates, arduous physical tasks, steam and water leaks, boiler air casing leaks, missing or deteriorated thermal insulation, and ventilation system deficiencies.

In addition, other factors that reduce physical stamina and enhance susceptibility to heat stress illness are dehydration, lack of sleep, illness, use of medication, drugs, alcohol, and the presence of atmospheric contaminants such as combustion gases or fuel vapors.

f. PHEL curve stay-time guidance is not limited to watchstanders, but applies to all personnel present in the workspace. Exposure time for personnel completing their watch rotation but returning to the workspace to perform other duties (i.e., repairs, PMS) may be limited by the existing heat stress conditions. Additionally, the recovery time guidance provided in section B0204(d) may require a specific rest/recovery time out of the workspace between intervals of working in the space and standing the watch in the workspace.

g. Heat Acclimatization. In most individuals, continued (i.e., daily) exposure to heat stress causes a series of physiologic adaptations called acclimatization, whereby the body becomes more efficient in coping with the heat stress. Heat acclimatization occurs gradually, usually requiring three weeks or more (although most of the process occurs in the first week).

B0202. RESPONSIBILITIES

a. The commanding officer shall:

(1) Establish and enforce an effective heat stress policy that ensures personnel heat exposures are limited per this chapter except in an operational emergency.

(2) Review and initial daily, heat stress surveys that result in reduced stay times.

(3) Conduct an inquiry into the circumstances surrounding all heat injuries that result in unconsciousness.

(4) Report to the immediate superior in command (ISIC) those material deficiencies, beyond ship's force capability to correct, which contribute to heat stress conditions aboard the ship.

(5). Report heat stress related cases as specified in paragraph B0204f.

(6) For ships without an automated heat stress system (AHSS) installed, ensure at least two portable, calibrated, and operable WBGT meters are available onboard.

(7) If an AHSS is installed, maintain at least one portable, calibrated, and operable WBGT meter on-board in the event that the automated system should fail.

b. The medical department representative (MDR) shall:

(1) Review all engineering and non-engineering heat stress surveys to determine obvious inaccuracies, reduced PHEL stay times, and any personnel protective actions being taken. Submit heat stress surveys that result in reduced stay times to the commanding officer daily for review.

(2) Provide training to divisions on heat stress health hazards, symptoms, prevention, and first aid procedures, upon request.

(3) Prepare reports of heat stress related cases as specified in paragraph B0204f.

(4) **For submarines,** the MDR conducts heat stress surveys in engineering spaces.

c. The engineering officer/reactor officer shall:

(1) Ensure dry-bulb thermometers are installed per paragraph B0204b(1) and temperatures are monitored and recorded per paragraph B0204b(3) and (4).

(2) Assign and qualify engineering department personnel to perform heat stress surveys in engineering spaces.

(3) Assign and qualify supervisors to review dry-bulb temperatures or access AHSS readings and take the required actions per paragraph B0204.

(4) Review heat stress surveys and ensure stay times for engineering/reactor personnel are being properly determined as specified in paragraph B0205. Limit personnel heat exposures accordingly, except as approved by the commanding officer in an operational emergency.

(5) If maintenance or repair is required, record all heat stress related deficiencies on current ship's maintenance project (CSMP). Appendix B2-B provides heat stress trouble-shooting and recommended repair actions.

d. The supply officer, air boss, and other department heads shall:

(1) Ensure dry-bulb thermometers are installed per paragraph B0204b(1) and temperatures are monitored and recorded per paragraph B0204b(3) and (4).

(2) May assign and qualify departmental personnel to conduct heat stress surveys or access AHSS readings of departmental spaces. Qualification of personnel shall be as specified in paragraph B0206b.

(3) Ensure the heat stress surveyor conducts heat stress surveys per B0204c(4) and B0204c(5).

(4) Assign and qualify supervisors to review dry-bulb temperatures or access AHSS readings and take the required actions per paragraph B0204.

(5) Review heat stress surveys and ensure stay times for personnel are being properly determined as specified in paragraph B0205. Limit personnel heat exposures accordingly, except as approved by the commanding officer in an operational emergency.

(6) If maintenance or repair is required, record all heat stress related deficiencies on current ship's maintenance project (CSMP). Appendix B2-B provides heat stress trouble-shooting and recommended repair actions.

e. Division officers shall:

(1) Limit personnel heat exposures per established stay times, except as approved by the commanding officer in an operational emergency.

(2) If maintenance or repair is required, record all heat stress related deficiencies on Current Ship's Maintenance Project (CSMP). Appendix B2-B provides heat stress trouble-shooting and recommended repair actions.

f. Heat-stress surveyors shall:

(1) Be personal qualification standard (PQS) qualified per NAVEDTRA 43460-4B, heat stress monitor.

(2) Perform heat stress surveys as required by paragraph B0204.

g. All hands shall:

(1) Obtain prompt medical attention for personnel who exhibit heat stress symptoms.

(2) Follow recommended work practices and procedures for controlling heat stress hazards.

(3) All hands are required to complete heat stress training upon reporting aboard.

B0203. HEAT STRESS ELEMENTS

a. Monitoring and surveying of heat stress conditions. (See paragraph B0204.)

b. Establishing safe work schedules in heat stress environments. (See paragraph B0205.)

c. Investigating and reporting personnel heat injuries. (See paragraph B0204f and reference B2-1.)

d. Training. (See paragraph B0206.)

e. Recordkeeping. (See paragraph B0204c(3)(f).)

B0204. HEAT STRESS MONITORING AND SURVEYING

a. Definitions:

(1) **Monitoring.** Observing and recording temperatures of dry bulb (DB) thermometers at specified watch and/or workstations.

(2) **Surveys.** Use a WBGT meter or AHSS to measure DB, WB, and GT, and compute the WBGT index to determine the amount of time it is safe to work in a given space. Personnel conducting a survey shall validate the WBGT index using the following formula:

WBGT = (0.1 x DB) + (0.7 x WB) + (0.2 x GT)

(3) **Heat Stress Surveyor.** A trained person assigned to conduct or review AHSS readings for any required surveys.

b. Heat Stress Monitoring:

(1) **Dry-Bulb Thermometer Positioning.** A hanging DB thermometer (alcohol in glass - NSN 9G-6685-00-243-9964) shall be permanently mounted at watch and workstations throughout the ship where heat stress conditions may exist. Evaluation and designation of potential heat stress areas is part of the industrial hygiene survey. A DB thermometer shall also be mounted in non-air conditioned spaces, not normally manned, in which personnel may have to periodically work or conduct

maintenance, such as storerooms. These thermometers shall be mounted in a position so they indicate the most accurate representative temperature for the area where workers/watchstanders spend the majority of their time. Placement of the DB thermometers may be in or out of the ventilation air stream but must be hung at least two feet from any supply ventilation terminal/opening. Thermometers shall be hung with a non-heat conducting material such as plastic tie-wrap or string (never hang with metal wire) and positioned to minimize the influence of any adjacent or local heat or cold sources (avoid direct contact between thermometer and hot/cold structural surfaces). If the difference between the hanging DB thermometer and the DB temperature measured with the WBGT meter, during a survey, is five degrees Fahrenheit or greater at any watch or workstation, then the DB thermometer is not representative of the temperature at the workstation. DB thermometers do not require calibration, so if found inaccurate, the hanging DB must be relocated, replaced, or validated by aligning the etch mark with the freezing point (32 degrees Fahrenheit). A DB thermometer shall be temporarily mounted to monitor conditions where repairs or maintenance are being performed in a heat stress area. The ship shall install DB thermometers, at a minimum, in main machinery spaces, auxiliary machinery spaces, emergency diesel spaces and other engineering spaces containing heat sources, as well as in laundries, dry cleaning plants, sculleries, galleys, bake shops, and steam catapult spaces.

NOTE

"No Calibration Required" (NCR) stickers are not required to be placed on DB thermometers.

(2) **Automated Heat Stress System.** The AHSS units shall be mounted in a position so they indicate the most accurate representative temperature for the area where workers/watchstanders spend the majority of their time. The AHSS units shall be positioned so as to avoid interference with space activity. If ventilation is present at the workstation where an AHSS unit will be installed, then the sensor should be located in relation to the ventilation duct such that airflow to the sensor does not exceed 600 fpm.

NOTE

Dry-bulb thermometers must still be mounted on ships with AHSS. The ability to conduct manual dry-bulb reading procedures must be available in the event that access to the data on the AHSS workstation is unavailable due to power failure, securing of the workspace, etc.

(3) **Dry-Bulb Temperature Readings**. The ship shall record DB temperature readings when the ship is underway or when potential heat stress conditions exist while in port. The ship shall monitor the following compartments when manned: main machinery spaces, (fire rooms and engine rooms), auxiliary machinery spaces, emergency diesel spaces, laundry spaces, sculleries, galleys, bake shops, and steam catapult spaces. Assigned personnel shall monitor compartments as follows:

(a) Every four hours for manned spaces if DB temperatures do not exceed 85 degrees Fahrenheit.

(b) Every hour for manned spaces if DB temperatures exceed 85 degrees Fahrenheit.

(c) Every hour at temporary installations where the DB temperature exceeds 85 degrees Fahrenheit during repair or maintenance operations.

(4) **Dry-Bulb Temperature Recording**

(a) Hanging DB temperatures shall be recorded on a prepared paper log form and reviewed by the space supervisor (e.g., machinist mate of the watch (MMOW), galley captain). If a DB temperature exceeds 100 degrees Fahrenheit (watch/work length four hours or less), or 90 degrees Fahrenheit (watch/work length greater than four hours), or 85 degrees Fahrenheit (in the scullery) per paragraph B0204c(4)(a), the space supervisor shall circle (in red) the DB reading and immediately notify the watch supervisor (e.g., engineering officer of-the-watch (EOOW), division officer, etc.). The watch supervisor shall direct heat stress surveys to be conducted and enforce the resulting stay times.

(b) The space supervisor (e.g., MMOW, galley captain) shall record and review the DB temperatures for the

AHSS either as part of the centralized data acquisition system, or as printed copies. The space supervisor shall initial in the appropriate box and check the appropriate notation in the computer log. If a DB temperature exceeds the temperature per paragraph B0204c(4)(a), the space supervisor shall immediately notify the watch supervisor (e.g., EOOW, division officer). The watch supervisor shall direct heat stress surveys to be conducted and enforce the resulting stay times.

c. Heat Stress Surveys - WBGT Meter

(1) The heat stress surveyor determines environmental heat stress conditions using the WBGT meter (Model RSS 220, NSN 7G-6685-01-055-5298 or heat stress monitor - Model 960, NSN 3H-6665-01-333-2590), or the AHSS which provides a computer display, hard drive storage and printout of the heat stress information. Each method measures dry-bulb, wet-bulb, and globe temperature and integrates them into a single heat stress value, the WBGT index. Appendix B2-C, Use of the WBGT Meter, provides detailed information and procedures regarding the proper use and care of the WBGT meter. The surveyor uses the WBGT index, along with the individual's physical exertion level, to determine the permissible heat exposure limits referred to as the physiological heat exposure limits or PHEL stay times.

NOTE

The operating range for the RSS-220 and Vista Model 960 WBGT meters is 65 degrees Fahrenheit to 150 degrees Fahrenheit. The operating range for the AHSS is 32 degrees Fahrenheit to 150 degrees Fahrenheit and 10% to 95% relative humidity. Use of these meters outside of this range will not provide accurate temperature measurements.

(2) **Measurement Techniques**

(a) When surveying a work or watch station using the WBGT meter, the surveyor shall position the meter where the worker/watchstander would normally stand or where the intended work is to be performed, with ventilation arranged to provide normal ventilation at that location. For specific operating instructions, see appendix B2-C paragraph 3.

(b) The heat stress surveyor shall conduct the first WBGT measurement in the workspace after the meter has been in the space five minutes to enable it to equilibrate to the surrounding area. As the meter is moved from one site to another, the meter should be at each site for three minutes to allow for stabilization of the first reading (DB) in the series to be taken. To determine when each sensor has stabilized, the monitor should watch the 0.1 degrees Fahrenheit digit of the display. When the 0.1 degrees Fahrenheit digit stops changing or when it oscillates between a larger or smaller value, the sensor has stabilized and the value can be recorded. (If oscillating, always record the higher of the two values).

(c) Where AHSS units are used, watchstanders should take care not to shield the automated WBGT sensor from airflow or heat sources so that readings reflect an accurate watchstander stay time.

(3) **Recording and Reporting Survey Results:**

(a) The heat stress surveyor shall record all non-automated survey readings to the nearest 0.1 degrees Fahrenheit on a heat stress survey sheet similar to the OPNAV 5100/17 form available at Navy Forms on-line at http://forms.daps.dla.mil. The surveyor shall use the WBGT index reading to determine the PHEL stay time per section B0205. The surveyor shall record the PHEL curve used and the corresponding exposure time on the survey sheet. Upon completion of the survey and determination of PHEL stay times, the heat stress surveyor shall note any stay times for manned watch or workstations that, under routine conditions, are less than the watch or work period. The surveyor shall circle these readings on the sheet in red. The surveyor shall notify space supervisors and responsible department heads immediately of the reduced exposure times. If a survey results in a PHEL stay time which is less than the work or watch period, the department head responsible for the space shall promptly notify the commanding officer of the condition, indicating action being taken to protect personnel and/or to reduce the excessive heat-stress situation.

(b) The heat stress surveyor shall print all automated survey readings on a pre-formatted Heat Stress Survey Sheet. The surveyor shall circle in red, on the Heat Stress Survey Sheet, any PHEL stay times for manned watch or

workstations that, under routine conditions, are less than the watch or work period. The heat stress surveyor shall notify workspace supervisors and responsible department heads immediately of the reduced exposure times. The department head shall promptly notify the commanding officer of the condition, indicating personnel protective action being taken, and action, if any, to reduce the excessive heat stress situation.

(c) Ships shall use a heat stress survey sheet in a format similar to the OPNAV 5100/17 form available at Navy Forms on-line at http://forms.daps.dla.mil to record heat stress information. Ships using a database or the AHSS may use a computer printout for the heat stress survey sheet. The surveyor shall record the following heat stress information on the heat stress survey sheet manual or computer printout:

1. Date and time of survey;

2. In the follow-on survey form, identify a time and temperature;

3. Stations surveyed, including the following information for each station:

a. Time WBGT measurement was taken at the location;

b. Hanging DB temperature. Not required for the automated system;

c. WBGT meter readings for DB, WB, GT, and WBGT;

d. PHEL curve for the station and the corresponding exposure time.

NOTE

Only the column that pertains to the current watch/work situation needs to be completed (e.g., all four columns do not need to be filled in).

4. The heat stress surveyor shall check to ensure that the WB < DB; GT ≥ DB; and WB < WBGT < GT. Once this is verified then the heat-stress surveyor shall manually calculate the highest WBGT index obtained using the formula:

$$WBGT = (0.1 \times DB) + (0.7 \times WB) + (0.2 \times GT)$$

The surveyor shall compare calculated WBGT to the meter WBGT and the two readings shall be within 0.2 degrees Fahrenheit. A manual calculation of the WBGT value is not required with the AHSS.

(d) The heat stress surveyor shall note any material deficiencies that may be contributing to adverse heat stress conditions and record them on the survey sheet. Additionally, personnel shall comment on the availability of drinking water on the survey sheet.

(e) The surveyor shall record the hanging DB temperatures on the heat stress survey sheet. If the difference between the hanging DB thermometer and the DB temperature measured with the WBGT meter, during a survey, is five degrees Fahrenheit (°F) or greater at any watch or workstation, the DB thermometer is not representative of the temperature at the workstation. Relocate, replace or validate the hanging DB by aligning the etch mark with the freezing point (32 degrees Fahrenheit). Comparing the hanging DB temperature values with the AHSS DB values is not required.

(f) Following the department head's review, all Heat Stress Survey Sheets, including engineering, shall be delivered to the MDR. The MDR shall review all engineering and non-engineering heat stress surveys to determine obvious inaccuracies, reduced PHEL stay times, and any personnel protective actions being taken and submit heat stress survey sheets daily to the commanding officer. The commanding officer shall initial the survey sheets, and return the sheets to the MDR. The MDR shall retain heat stress surveys sheets for one-year.

(4) **Space Surveys.** Ships shall conduct the survey of spaces for heat stress using the WBGT meter or the AHSS:

(a) At all manned watch/workstations within the space whenever the temperature from a permanently mounted hanging DB thermometer reaches or exceeds the following temperature requirements:

PHEL I through III	
Watch/Work length 4 hours or less	DB => 100°F
Watch/Work length greater than 4 hours	DB => 90°F
PHEL IV through VI	DB = 85°F.

NOTES:

1. Daily WBGT space surveys at the hottest time of the day are no longer required.

2. Shipboard conditions cannot be adequately addressed by a single dry bulb value. For watches longer than four hours or activity levels greater than PHEL III, a 100 degrees Fahrenheit temperature would miss potentially serious heat stress conditions. The values listed above take into consideration likely levels of relative humidity, watch duration's, and levels of activity. Under normal operations, routine watches in engineering spaces are expected to be four hours at a PHEL III or lower. PHEL IV through VI apply to above average work rates.

(b) In any space when a heat injury (heat exhaustion or heat stroke) occurs.

(c) Prior to conducting engineering casualty control (ECC) drills:

1. If the drill-set exceeds three hours (not required in spaces not affected by the drill or in areas that are unmanned),

2. If already in a reduced stay time, the surveyor shall use the most current heat stress survey and calculate stay times for ECC watchstanders using the ECC PHEL values in appendix B2-A.

The length of the exercises cannot exceed the watch PHEL stay times.

(d) In any space when the commanding officer determines that a heat stress situation may occur.

(e) As required for follow-on surveys (see paragraph B0204.c(5)).

(5) **Follow-on Surveys**. Once a heat stress survey has been conducted, follow-on surveys for the remainder of that day shall be accomplished as identified below. Surveys on the next day shall be conducted according to paragraph B0204.c(4). Follow-on surveys shall be accomplished using the WBGT meter as follows:

(a) For engineering spaces on nuclear, gas turbine and diesel powered ships.

1. If the survey resulted in a PHEL stay time greater than the duration of the normal watch or work period and did not require a change from the normal watch/work time. No further follow-on surveys are required unless the hanging DB temperature increases by more than five degrees Fahrenheit from the hanging dry bulb temperature in the previous survey.

2. If the survey resulted in a PHEL stay time less than the duration of the manned watch or workstation then the watch/work times shall be adjusted to reflect the new PHEL stay times indicated by the WBGT. A follow-on survey is only required if the DB temperature increases by five degrees Fahrenheit or more from the hanging DB temperature in the previous survey. If the hanging DB temperature drops below the value in paragraph B0204c(4) and return to a normal watch/work time is desired, a survey shall be conducted to ensure conditions allowing a return to normal watch/work periods have been reestablished.

(b) Two options are provided for follow-on surveys for engineering spaces on non-nuclear, steam-powered ships and for laundries, sculleries, galleys, steam catapult spaces and arresting gear spaces.

1. Follow-on surveys where WB and DB temperatures are not monitored and recorded each hour. Follow-on surveys shall be conducted prior to the end if the current manned watch or work period as indicated in the previous survey. Follow-on surveys shall continue to be conducted each watch/work period until the conditions specified in paragraph B0204c(4) no longer exist.

2. Follow-on surveys where WB and DB temperatures are monitored and recorded each hour at manned workstations.

a. If the WBGT survey resulted in a PHEL stay time greater than the duration of the normal watch or work period, a change from the normal watch/work time is not required. Follow-on surveys are not required unless the DB temperature increases by five degrees Fahrenheit or more and/or WB temperature increases by three degrees Fahrenheit or more from the DB and WB temperatures recorded from the previous survey. The DB and WB temperature must be measured each time using the same instrument/device. The WBGT meter, motorized psychrometer, or commercially available hygrometer may be used to measure DB and WB temperature. If the DB temperature drops below the value in paragraph B0204c(4) and return to a normal watch/work time is desired, then a survey shall be conducted to ensure conditions allowing a return to normal watch/work periods have been reestablished.

b. If the WBGT survey resulted in a PHEL stay time less than the duration of the manned watch, or work period, the watch/work time shall be adjusted to reflect the new stay times indicated by the WBGT. Follow-on surveys are not required unless the DB temperature increases by five degrees Fahrenheit or more and/or WB temperature increases by three degrees Fahrenheit or more from the DB and WB temperatures recorded from the previous survey. The DB and WB temperature must be measured each time using the same instrument/device. The WBGT meter, motorized psychrometer, or commercially available hygrometer may be used to measure DB and WB temperature. If the DB temperature drops below the value in paragraph B0204c(4) and return to a normal watch/work time is desired, then a survey shall be conducted to ensure conditions allowing a return to normal watch/work periods have been reestablished.

NOTE:

The department head may elect to have more than one stay time rotation in a workspace if permitted by PHEL. This would allow the majority of personnel to take advantage of a longer stay time instead of limiting all personnel to the most restrictive stay time. If more than one watch time rotation is implemented for a space it shall be indicated on the heat stress survey sheet.

For example: A steam-powered ship in the Indian Ocean has obtained the following readings from an auxiliary space during the latest heat stress survey conducted at 1400:

Top Watch	WBGT = 92	PHEL = II,	Stay time = 4:10
Evap Watch	WBGT = 93	PHEL = II,	Stay time = 3:50
Air Comp Watch	WBGT = 92	PHEL = II,	Stay time = 4:10
SSTG Watch	WBGT = 92	PHEL = II,	Stay time = 4:10
Messenger	WBGT = 92	PHEL = III,	Stay time = 3:30

The engineering officer assigns a 3 X 6 watch (three hours watch in the space and six hours outside the space) for the evap watch and the messenger. The engineer officer assigns everyone else in the space to a 4 X 8 watch (four hours watch in the space and eight hours outside the space). The time outside the space must be in a cooler environment.

(c) **ECC**. A heat stress survey to restore the normal watch is not required at the end of the ECC drill set unless a DB temperature at any manned watch station exceeds the appropriate value identified in paragraph B0204c(4)(a).

(6) **Time Weighted Mean (TWM) WBGT Values.** The TWM WBGT is for use in especially hot environments where reduced stay times have been imposed on watch/work standers. The TWM WBGT is an optional, not mandatory provision, for use if an air-conditioned booth or cooler space is available for personnel to spend time in the cool climate and afford them some relief from the heat in the space. When implemented, the TWM changes the WBGT value for that individual and increases the length of time they can now spend at their watch/work station. Appendix B2-E provides ships that have this ability with a way of properly calculating the new WBGT value.

d. Recovery Time for Personnel Reaching Exposure Limits

(1) Supervisors shall direct personnel standing watch or working in spaces in reduced stay times (except in operational emergencies as directed by the CO) to leave the heat stress environment prior to the expiration of the PHEL stay time. These personnel shall move to a cool, dry area conducive to rapid physiological recovery (an area with a DB temperature of 80 degrees Fahrenheit or less).

(2) Preferred recovery environments are those that are air conditioned within the standards of reference B2-2. Provided there is no evidence of accumulated fatigue, the length of recovery time shall be equal to twice the exposure time or four hours whichever is less. After completing the necessary recovery period in preferred environmental conditions, an individual who nonetheless remains tired, unable to carry out normal work requirements, or has an increased incidence of health disorders shall be referred to the MDR for evaluation.

(3) Supervisors shall direct personnel experiencing heat stress symptoms while standing watch or working in the workspace, to report immediately to the MDR for evaluation.

e. Recommendations for Working in Heat Stress Environments.

(1) Drink more water than satisfies thirst, but not more than 1.5 liters (about one and half quarts) per hour. Do not wait until you are thirsty to start drinking (scuttlebutts must be readily available and in working order). It is important that personnel stay hydrated. A device that has proved very effective in helping personnel to stay hydrated on flight decks, steam catapult spaces, engineering spaces, laundry and in other hot locations on ship is the Camelbak® (or equivalent) drinking system. It holds 1.8 liters of water and is worn like a backpack with a straw mechanism that allows the person to drink anytime or anywhere. The Camelbak® (or equivalent) has proved very effective in helping to keep personnel hydrated especially in areas such as the Arabian Gulf. It is available in the stock system under NSN 9Q-8465-01-396-9855.

(2) Eat three well-balanced meals daily.

(3) Get adequate rest. At least six hours of continuous sleep per 24 hours is recommended.

(4) Except where fire retardant or fire-fighting clothing is required, wear clean clothing composed of at least 35 percent cotton (more natural fiber content allows more effective evaporation of water from clothing).

(5) Do not take salt tablets.

(6) Limit intake of caffeinated drinks.

(7) The fleet has used several cooling vests in the stock system in a limited capacity. Initial research on one of these vests shows that if properly used in a heat stress environment it can reduce thermal strain. However, when using cooling vests, personnel shall adhere to PHEL stay times as described in this chapter until revised PHEL curves are established for the cooling vest.

NOTE

The use of using cooling vests that contain paraffin-based phase change material is not recommended. This material is flammable and may release toxic vapors when burning. The MSDS information should be reviewed prior to using any of these products. This material must be stored per the requirements for flammable material in chapter C23.

f. Reports and Forms

(1) Personnel exposed to excessive heat stress may require the professional judgment of a trained MDR to determine the presence or absence of a heat-related disorder. If the result of the evaluation indicates a heat-related case the MDR shall enter the heat-related injury or illness into the web-enabled safety system (WESS) per reference B2-3.

(2) NAVENVIRHLTHCEN shall provide a fiscal year-end summary of shipboard heat stress cases from the WESS database by type of operation, and ship class to CNO (N09F).

B0205. PHEL DETERMINATION

a. The WBGT index provides a measure of environmental conditions. In order to determine the permissible heat exposure in these conditions, the amount of work of a particular job must be known. The more strenuous the job, the shorter the allowable exposure time. The Navy has developed six PHEL curves, each applying to a different work rate, ranging from light work (PHEL curve I) to heavy work (PHEL curve VI). The PHEL curve general applicability table (table B2-A-1) in appendix B2-A provides the applicable stay times allowed for a specific WBGT reading. For types of work not presented in table B2-A-1, the MDR should

consult reference B2-2, articles 3-12 and 3-13. For comparison, examples of light work include sweeping down, painting, adjusting automatic combustion controls, changing and cleaning lube oil strainers, and bleeding hydraulic oil. Examples of heavy work include manually chipping and wire brushing in preparation for painting, handling cargo and supplies, replacing large valves, cleaning lube oil sumps, and disassembly or reassembly of large or heavy equipment. The PHEL curves were developed and are accurate for normal, healthy, heat-acclimatized personnel who have had adequate rest, (six hours continuous sleep in the last 24 hours), adequate water intake, and adequate recovery time from previous heat stress exposure (two hours recover for every 1 hour exposure or four hours maximum). Personnel are assumed to be wearing clothing consisting of a least 35% cotton fiber, not containing starch, and readily permeable to water transfer. Table B2-A-2 presents the PHEL chart in a tabular format. Table B2-A-3 presents the PHEL values applicable when fuel combustion gases are present.

b. Procedures

(1) **Curve Selection**

(a) **Routine Operations**. Applicable PHEL curves should be determined by selecting the appropriate curve listed in table B2-A-1.

(b) **Non-routine Operations**. Non-routine operations, such as performing operations in out-of-normal plant configurations, increases in normal watchstander work rate, and minor equipment casualties require the use of the next higher number curve above that specified in table B2-A-1 for routine operations. For example, if the stay time for a particular watchstander is determined to be PHEL Curve I during normal operations, then the exposure limit for the watchstander should be determined using PHEL curve II during difficult or more active than normal watches.

(c) **Engineering Casualty Control Exercises**. Watchstanders shall have their stay times determined by selecting the appropriate curve listed in table B2-A-1.

(d) **Heavy Work**. Personnel conducting heavy repairs or other strenuous work shall have their stay time determined by using PHEL curve VI.

(2) **Effects of Personnel Health Status on Curve Selection**. As indicated, the PHEL curves and the assignment in table B2-A-1 are based on normal, healthy personnel who have adequate rest and recovery from previous heat stress exposures. Personnel having repetitive exposures to heat stress without sufficient recovery may experience cumulative fatigue. Additionally, personnel with a respiratory system cold and/or infection, lacking sufficient sleep (less than six hours in the past 24 hours), experiencing dehydration, having clinically confirmed hypertension or taking medication which adversely effects body temperature are much more prone to systemic heat injuries. Maximum exposure limits for these personnel cannot be reliably predicted using the PHEL chart in table B2-A-1. The senior MDR on a case-by-case basis shall determine appropriate exposure limits for these personnel.

(3) **Curve Selection if Personnel Heat Injuries Occur**. If, after determining personnel stay times per this section, a heat exhaustion or heat stroke occurs, then the stay times for all other personnel in the space shall immediately be reduced by recalculating stay times using the next numerically higher PHEL curve than specified by table B2-A-1. The work and health status of the individual suffering the injury shall be reviewed. When the cause of the injury has been reasonably resolved, the stay times for personnel in the space shall be determined using the latest WBGT index and the normally appropriate curves as indicated in table B2-A-1.

(4) **WBGT/PHEL Determination**. The heat stress surveyor shall use the PHEL table (table B2-A-2). To use the PHEL table, the heat stress surveyor must first round the recorded WBGT index to the next higher whole number value. This can be done easily as the WBGT index is recorded in tenths of a degree F. For example: 85.1 degrees Fahrenheit would be rounded to 86 degrees Fahrenheit and 89.9 degrees Fahrenheit would be rounded to 90 degrees Fahrenheit; but 92.0 degrees Fahrenheit would remain 92 degrees Fahrenheit. Using the whole number value of the WBGT index, the heat stress surveyor would obtain the permissible stay time in hours and minutes under the column for the PHEL curve determined using table B2-A-2. Hence, for a

recorded WBGT index of 85.1 degrees Fahrenheit or 85.8 degrees Fahrenheit the stay time for PHEL curve III is five hours and 55 minutes.

(5) The current WBGT/PHEL stay-time guidance for each watchstander can be read from any of the AHSS computer workstations.

(6) **Impact of Personal Status Change on Exposure Limits**. If a person's status changes during the period of a watch (e.g., the person assumes a watch in a different location or works at a different exertion level), stay times shall be computed using the procedures for remaining safe stay times provided in reference B2-2, article 3-13(5)(b).

(7) **Impact of Fuel Combustion Gases (Stack Gas) and Fuel Vapors on Exposure Limits.**

(a) Fuel combustion gases (stack gas) and fuel vapors can have severe physiological impact on personnel. The effects of these environmental factors are intensified by heat stress. Prolonged exposure to relatively low concentrations can impact the ability of personnel to work safely. If someone entering a workspace or area for the first time in approximately four hours or more can smell the odor of stack gas and/or fuel vapors, then a harmful concentration may be present. Personnel should be checked for the following symptoms:

1. Eyes watering and/or burning.

2. Difficulty breathing.

3. Tingling or numbness of the tip of the tongue, tip of the nose, finger tips and/or toes.

4. Generalized sensation of mild alcoholic intoxication without alcohol consumption within the past 24 hours.

(b) If two or more of the above symptoms are exhibited, then exposure limits must be reduced as follows:

1. Using the latest WBGT index values, determine the PHEL stay time by using table B2-A-3; or

2. Calculate the PHEL stay time for existing heat stress conditions per paragraph B0205b(4), and divide that stay time by three to obtain the new stay time. For example, if the exposure limit due to heat stress is four hours, then the exposure limit with stack gas and or fuel vapors present would be reduced to one hour and 20 minutes. Prompt removal of affected personnel to fresh air is essential. Article 3-11 of reference B2-2 discusses the physiological effects to personnel exposed to stack gas and fuel vapors in detail.

B0206. TRAINING

a. All hands shall receive heat stress training upon reporting aboard. This training may be conducted by showing the heat stress videotape "Play it Cool: Heat Stress Prevention Afloat" (8055801-DN). At a minimum this training must include:

(1) Heat stress health hazards;

(2) Symptoms of excessive heat stress exposure;

(3) Heat stress first aid procedures;

(4) Heat stress monitoring; and

(5) Causes of heat stress conditions.

b. Heat-stress surveyors assigned to perform WBGT surveys shall be trained and qualified using the heat stress surveyor watchstation 303 (formally heat stress monitor watchstation 303) of the safety programs afloat personnel qualifications standard (PQS), NAVEDTRA 43460-4B within 12 weeks of assignment.

c. Training and information on the automated heat stress system (AHSS) is available in appendix B2-C.

CHAPTER B2

REFERENCES

B2-1. OPNAVINST 5102.1D/MCO P5102.1B

B2-2. NAVMED P-5010-3, Manual of Naval Preventive Medicine, Chapter 3: Ventilation and Thermal Stress Ashore and Afloat

B3-3. NEHC Technical Manual NEHC TM OEM 6260.6A, Prevention and Treatment of Heat and Cold Stress Injuries

Table B2-A-1

PHEL CURVE GENERAL APPLICABILITY SELECTION

PERSONNEL	PHEL CURVE: Routine Watch	PHEL CURVE: Casualty Control Drills
I. Steam Propelled Ships		
A. Propulsion Spaces		
1. BTOW (Boiler Technician of the Watch)	II	III
2. Console Operator	I	I
3. Upper Levelman (checkman)	II	III
4. Lower Levelman	II	III
5. MFP (Main Feed Pump) Watch	II	III
6. Burnerman	II	III
7. EOOW (Engineering Officer of the Watch)	I	I
8. MMOW (Machinist's Mate of the Watch)	II	III
9. Throttleman	I	I
10. EMOW (Electrician's Mate of the Watch)	I	I
11. Upper Levelman(SSTG) (Ship's Service Turbine Generator)	II	III
12. Lower Levelman (Lube Oil/Condensate)	II	III
13. Evaporator Watch	I	II
14. Messenger (See Note Below)	III	IV

NOTE:

Messenger stay times should be determined by taking the average of all WBGT Index values for the space not including the console booth. In most cases this will give a longer stay time than using PHEL Curve values listed for the messenger above.

B. Auxiliary Spaces		
1. All Watches	II	II

II. Diesel Propelled Ships		
A. All Engineering Watch Personnel (unless specified below)	I	II
B. Evaporator Watch	II	II
C. Messenger	III	IV
III. Gas Turbine Propelled Ships		
A. FFG-7 and CG 47 Class Ships		
1. All Engineering Watch Personnel	I	II
B. DDG-51 Class Ships		
1. All Engineering Watch Personnel (unless specified below)	II	III
2. Sounding and Security Watch	III	III

*Includes restricted maneuvering and casualty control drills

IV. Steam Catapult Spaces		
A. All Watches	II	II
V. All Other Surface Ship Spaces		
A. ECC Monitors/Inspectors	I	II
B. Laundry Personnel	III	NA
C. Scullery Personnel	V	NA
D. Galley & Food Service Line Personnel	II	NA
VI. Submarines		
A. Engine Room		
1. EOOW	I	I
2. EWS	II	III
3. Throttleman	I	I
4. Reactor Operator	I	I
5. Electrical Operator	I	I
6. Upper Level	II	III
7. Lower Level	II	III

8. Evaporator Watch	I	II
9. Engineering Drill Monitors	NA	II
B. Auxiliary Spaces		
1. All Watches	II	II
C. Other Spaces		
1. Food Service Personnel	II	NA

FIGURE B2-A-1

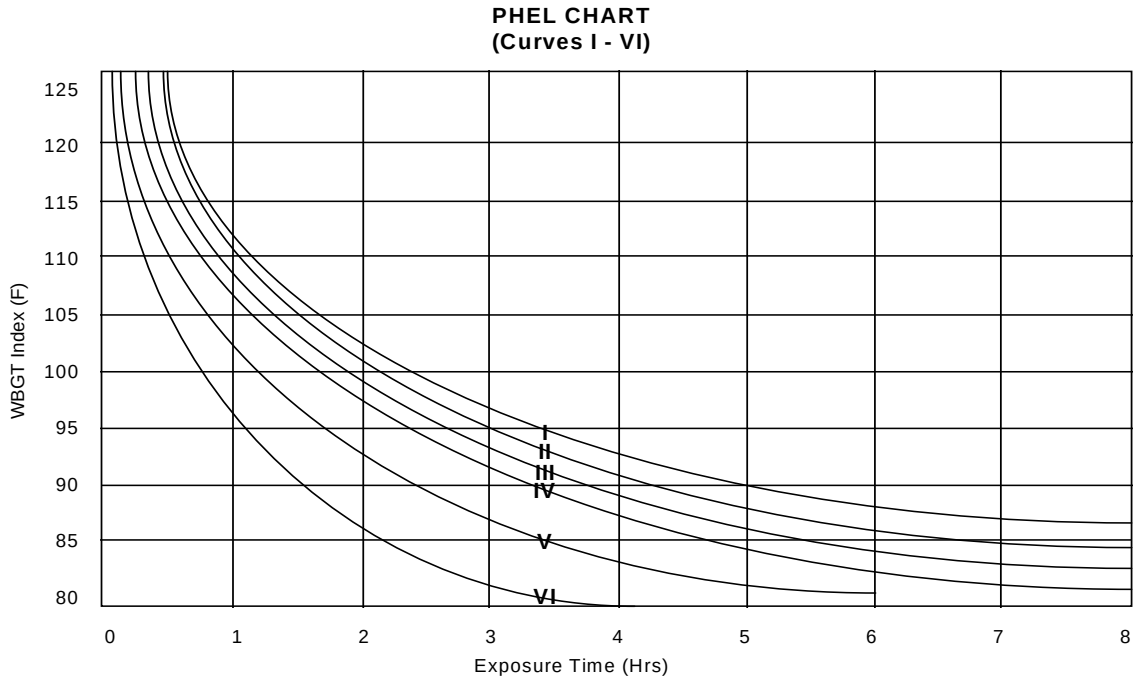


Table B2-A-2
PHYSIOLOGICAL HEAT EXPOSURE LIMITS (PHEL) TIME TABLE
(Without the presence of fuel combustion gases/fuel vapors)

	Six PHEL Curves (Total Exposure Time in Hours: Minutes)					
WBGT Index (F)	I	II	III	IV	V	VI
80.0	>8:00	>8:00	>8:00	8:00	6:35	4:30
81.0	>8:00	>8:00	>8:00	7:45	6:00	4:05
82.0	>8:00	>8:00	8:00	7:05	5:25	3:40
83.0	>8:00	8:00	7:45	6:25	4:55	3:20
84.0	>8:00	8:00	7:05	5:55	4:30	3:05
85.0	8:00	7:45	6:30	5:20	4:05	2:50
86.0	8:00	7:05	5:55	4:55	3:45	2:35
87.0	7:25	6:30	5:25	4:30	3:25	2:20
88.0	6:45	5:55	4:55	4:05	3:10	2:10
89.0	6:10	5:25	4:30	3:45	2:50	2:00
90.0	5:40	5:00	4:10	3:25	2:40	1:50
91.0	5:15	4:35	3:50	3:10	2:25	1:40
92.0	4:50	4:10	3:30	2:55	2:15	1:30
93.0	4:25	3:50	3:15	2:40	2:00	1:25
94.0	4:05	3:35	3:00	2:25	1:50	1:15
95.0	3:45	3:15	2:45	2:15	1:45	1:10
96.0	3:25	3:00	2:30	2:05	1:35	1:05
97.0	3:10	2:45	2:20	1:55	1:25	1:00
98.0	2:55	2:35	2:10	1:45	1:20	0:55
99.0	2:40	2:20	2:00	1:40	1:15	0:50
100.0	2:30	2:10	1:50	1:30	1:10	0:45
101.0	2:20	2:00	1:40	1:25	1:05	0:45
102.0	2:10	1:50	1:35	1:15	1:00	0:40
103.0	2:00	1:45	1:25	1:10	0:55	0:35
104.0	1:50	1:35	1:20	1:05	0:50	0:35
105.0	1:40	1:30	1:15	1:00	0:45	0:30
106.0	1:35	1:25	1:10	0:55	0:45	0:30
107.0	1:30	1:15	1:05	0:50	0:40	0:25
108.0	1:20	1:10	1:00	0:50	0:35	0:25
109.0	1:15	1:05	0:55	0:45	0:35	0:25
110.0	1:10	1:00	0:50	0:40	0:30	0:20
111.0	1:05	1:00	0:50	0:40	0:30	0:20
112.0	1:00	0:55	0:45	0:35	0:25	0:20
113.0	0:55	0:50	0:40	0:35	0:25	0:15
114.0	0:55	0:45	0:40	0:30	0:25	0:15
115.0	0:50	0:45	0:35	0:30	0:20	0:15
116.0	0:45	0:40	0:35	0:25	0:20	0:15
117.0	0:45	0:40	0:30	0:25	0:20	0:10
118.0	0:40	0:35	0:30	0:25	0:15	0:10
119.0	0:35	0:35	0:25	0:20	0:15	0:10
120.0	0:35	0:30	0:25	0:20	0:15	0:10
121.0	0:35	0:30	0:25	0:20	0:15	0:10
122.0	0:30	0:25	0:20	0:15	0:15	0:10
123.0	0:30	0:25	0:20	0:15	0:10	0:10
124.0	0:25	0:25	0:20	0:15	0:10	0:05

TABLE B2-A-3

(With the presence of fuel combustion gases/fuel vapors)

	Six PHEL Curves (Total Exposure Time in Hours:Minutes)					
WBGT Index (F)	I	II	III	IV	V	VI
80.0	4:50	4:15	3:30	2:55	2:15	1:30
81.0	4:25	3:50	3:10	2:40	2:00	1:20
82.0	4:00	3:30	2:55	2:25	1:50	1:15
83.0	3:40	3:10	2:40	2:10	1:40	1:10
84.0	3:20	2:55	2:25	2:00	1:30	1:00
85.0	3:00	2:40	2:10	1:50	1:25	0:55
86.0	2:45	2:25	2:00	1:40	1:15	0:50
87.0	2:30	2:10	1:50	1:30	1:10	0:45
88.0	2:20	2:00	1:40	1:25	1:05	0:40
89.0	2:05	1:50	1:30	1;15	1:00	0:40
90.0	1:55	1:40	1:25	1:10	0:55	0:35
91.0	1:45	1:30	1:15	1:05	0:50	0:30
92.0	1:35	1:25	1:10	1:00	0:45	0:30
93.0	1:30	1:20	1:05	0:55	0:40	0:25
94.0	1:20	1:10	1:00	0:50	0:35	0:25
95.0	1:15	1:05	0:55	0:45	0:35	0:20
96.0	1:10	1:00	0:50	0:40	0:30	0:20
97.0	1:10	0:55	0:45	0:40	0:30	0:20
98.0	1:05	0:50	0:40	0:35	0:25	0:15
99.0	0:55	0:45	0:40	0:30	0:25	0:15
100.0	0:50	0:45	0:35	0:30	0:20	0:15
101.0	0:45	0:40	0:35	0:25	0:20	0:15
102.0	0:40	0:35	0:30	0:25	0:20	0:10
103.0	0:40	0:35	0:30	0:25	0:15	0:10
104.0	0:35	0:30	0:25	0:20	0:15	0:10
105.0	0:35	0:30	0:25	0:20	0:15	0:10
106.0	0:30	0:25	0:20	0:20	0:15	0:10
107.0	0:30	0:25	0:20	0:15	0:10	0:10
108.0	0:25	0:25	0:20	0:15	0:10	0:05
109.0	0:25	0:20	0:15	0:15	0:10	0:05
110.0	0:25	0:20	0:15	0:15	0:10	0:05
111.0	0:20	0:20	0:15	0:10	0:10	0:05
112.0	0:20	0:15	0:15	0:10	0:10	0:05
113.0	0:20	0:15	0:15	0:10	0:05	0:05
114.0	0:15	0:15	0:10	0:10	0:05	0:05
115.0	0:15	0:15	0:10	0:10	0:05	0:05
116.0	0:15	0:10	0:10	0:10	0:05	0:05
117.0	0:15	0:10	0:10	0:05	0:05	0:05

Appendix B2-B

HEAT STRESS TROUBLE-SHOOTING AND REPAIR ACTIONS

VENTILATION: If a ventilation problem is suspected, the WBGT meter should be positioned at the supply terminal/opening discharge such that the airflow is blowing into the left side of the WBGT meter. If the discharge air DB temperature is greater than 10 degrees Fahrenheit over the outside DB temperature, then a ventilation supply problem may be indicated. A reading of two terminals/openings per ventilation supply system serving the space is required. The below information may assist in determining the cause of the problem.

STANDARDS	HOW TO MEASURE DISCREPANCIES	CAUSES	RECOMMENDED ACTION
1. VENTILATION NSTM 510, Heating, Ventilation and Air Conditioning systems for Surface Ships			
a. Supply (1) Flow			
Duct velocity 2500 to 3500 fpm	Anemometer	Inlet obstructed	Remove obstructions
		Dirty screens	Clean Screens
Velocity of airflow at watchstander (NAVMED P-5010-3) about 250 fpm minimum		Wrong screen mesh (1-1/2 inches required	Replace with proper size mesh
		Toxic Gas Vent Dampers closed	Open and repair dampers
		Vent duct pressure losses due to dirty ductwork, leaks, unauthorized openings or missing access covers	Clean, repair or replace
		Supply terminal obstructed	Clean the terminal

STANDARDS	HOW TO MEASURE DISCREPANCIES	CAUSES	RECOMMENDED ACTION
(2) Flow (continued)		Terminal inoperable or missing	Replace terminal
		Supply fan not working properly:	Repair
		-Motor speed low (single phase or miswired)	Repair
		-Controller defective	Repair/Replace
		-Improper speed with exhaust fan	Repair fan interlock
		-Failed motor bearings	Repair
		Supply air short circuited by exhaust terminal	Relocate supply or exhaust terminal
At least one supply terminal at each watch-stander station without damper, which can be pointed at the watch-stander	Visual	Incorrect terminal type (should be corrosion resistant steel)	Replace terminal
		Terminal damper is not removed	Remove damper
High Efficiency Filters (HEPA) are dirty. (Ships equipped with a Collective Protection System)	HEPA filter differential pressure gauge. (See PMS)	Continuous use in a dirty environment such as an industrial availability or sand storm)	Replace filters

b. Exhaust			
Refer to specific HVAC Design Criteria Manual (DCM) for ship class. If no specific DCM exist for the ship class in question, refer to NAVSEA 0938-018-0010 (A/C & Ventilation DCM for Surface Ships). Exhaust ventilation is to be: -125% of supply ventilation for 1200 psi steam ships. -115% of supply ventilation for other ships except CPS ships -equal to supply ventilation on CPS ships plus sweep air from Type II airlocks	Anemometer	Exhaust fan not working properly: -Motor speed low (single phase or miss-wired) -Controller defective -Improper speed with exhaust fan -Failed motor bearings	Repair Repair Repair fan interlock Repair
Space pressure negative at ¼ to ½ inch of water is mandatory with supply and exhaust fans at the same speed (airflow should be into space when access is opened)	U-Tube Manometer	Exhaust inlet or outlet obstructed. Dirty screens. Wrong screen mesh (1-1/2 inches required.	Remove obstructions. Clean Screens. Replace with proper size mesh.
	Feel/visual	Vent duct pressure losses due to dirty ductwork, leaks, unauthorized openings or missing access covers. Toxic Gas Vent Dampers closed	Clean, repair or replace Open and repair dampers

Exhaust terminals in hot spots	Feel/Visual		Relocate terminal
2. INSULATION			
a. Piping & Machinery NSTM 635, Thermal, Fire and	Visual Check		
b. Acoustic Insulation Insulate all surfaces with temp. >125°F. Material/thickness IAW MIL-STD-769	Deteriorated cracked, worn, damaged	High traffic, walkway, standing, use of chain falls, etc.	Replace and install metal lagging/shielding
	Wet (water, oil, etc.)	Frequently occurring external leak Internal/ external one-time leak	Replace and cover with metal lagging/shielding Replace
	Missing insulation	Removed for access	Replace
		Replaceable pad missing Valve bonnets, etc	Install replaceable pad
c. After insulation is installed, surface temperature should not exceed 125°F. ***Note 1, 2**	Infrared handgun/ pyrometer-Note 1 Surface temp too high.	Insulation deteriorated/ compacted. Insulation too thin.	Increase insulation thickness. Paint surface with aluminum paint.

3. STEAM/WATER LEAKS

a. Turbine Shaft Seals NSTM 231, Propulsion and SSTG Steam Turbines			
Excessive shaft seal leakage, slight leakage is required to lubricate the shaft seals.	Visual	Shaft alignment	Align shaft
		Worn bearings	Replace bearings
		Improper or worn packing	Replace packing installation
Excessive shaft gland seal leakage, some turbine shaft seals are vented to a gland leak off system	Visual	Seal leaks beyond capacity of leak-off system	Repair Seal
		High exhaust steam Pressure	Rework exhaust dump Value
		Low vacuum in gland leak off system (less than 1/2 inch vacuum)	Secure unneeded auxiliary machinery. Check loop seals. Isolate idle equipment. Ensure gland exhaust fan operating
b. Mechanical Pump Seals NSTM 503, Pumps	Visual	Shaft alignment	Align shafting
		Worn bearings	Replace bearings
		Improper or worn package installation	Replace when leakage forms a stream

c. Pump Stuffing Boxes			
NSTM 503, Pumps	Visual	Packing not sufficiently tight	Tighten packing
Check for leakage for greater than 32 oz./min.	Measure	Gland bottomed out	Add packing
		Shaft alignment	Align shaft
		Worn bearings	Replace bearings
		Improper or worn packaging	Replace packing
d. Casing Joints			
NSTM 221, Boilers	Visual	Dirt on matting surfaces	Clean Surfaces
Check all areas of boiler casings for leakage	Feel	Improper bolt tightening	Retighten bolts
	Soap Suds	Warped doors/access	Replace doors/panels
		Cracked seams, fasteners missing or defective, faulty gaskets	Caulk seams, renew fasteners, replace/renew gaskets use tadpole gaskets
e. Piping			
NSTM 505, Piping	Visual	Pipe, valve or flange leaking	Repair or replace as necessary
Check for stained and wet lagging ***Notes 3, 4**		Pipe broken	Replace
f. Drains, Funnel			
No overflow	Visual	Check valve jammed	Repair check valve
		Drain funnel fouled	Clean drain funnel

4. BILGE

a. Dry Bilge Ships			
No water	Visual	Leaks Machinery Piping	Repair leaks
b. Wet Bilge Ships			
Minimize water (no quantitative standard)	Visual	Leaks Machinery Piping	Pump bilge water and/ or repair leaks

***Note 1** For ships designed to MIL-STD 769D or earlier revisions, the surface temperature after installing insulation was limited to 105°F.
***Note 2** Infrared Heat Gun Survey: Infrared heat guns may be borrowed from IMA or IMA requested to perform. (Heat gun should be used to detect hot spots. This equipment does not provide accurate temperatures).
***Note 3** Use extreme caution when inspecting pressurized or high temperature piping systems. Do not attempt repairs while system is pressurized.
***Note 4** Prior to removing lagging ensure that it does not contain asbestos

Appendix B2-C

USE OF THE WBGT METER

1. The basic instrument for assessing heat stress is the WBGT meter - a small, lightweight, portable instrument. The WBGT meter measures dry-bulb, wet-bulb, and globe temperature and electronically integrates these values into the WBGT Index. There are currently two meters available in the fleet: the RSS-220 meter and the Model 960. Each meter is assembled and operated per its technical manual, either NAVSEA SN000-AA-MMO-0010 for the RSS 220 meter, or NAVSEA S9491-AJ-MMO-010/0910/LP-464-1300 for the Model 960 meter, and the guidance contained within this instruction. Specific instructions for requisitioning and turn-in of units are available from Type Commanders. The Allowance Equipage List (AEL) for the meter is AEL 2-870003051. Experience has shown that the meter globe assembly may be damaged before the meter itself is damaged. Replacing the globe assembly, in the event of meter malfunction, may often eliminate the need to return the entire meter for repair. Similarly, the rechargeable batteries should also be checked before returning the entire meter for repair.

Supply information for the meter and accessories is:

a. Model RSS-220 (Note: No longer manufactured, but repair parts still available)

(1) WBGT meter. (NSN 7H-6685-01-055-5298)

(2) Globe assembly. (NSN 9G-6685-01-149-8635)

(3)Standard nickel cadmium rechargeable size AA batteries. (NSN 9G-6140-00-449-6001)

(4) WBGT meter accessories allowance parts list (APL) (100110001)

b. Model 960

(1) Heat stress monitor. (NSN 3H 6665-01-333-2590)

(2) Globe assembly. (Unavailable from SPCC at this time)

(3) Standard nickel cadmium rechargeable size AA batteries. (NSN 9G-6140-00-449-6001)

(4) Heat stress monitor allowance parts list (APL). (469990172)

2. **WBGT Index.** Environmental data displayed by the WBGT meter (heat stress monitor) are:

a. Shielded, ventilated dry-bulb temperature (DB).

b. Shielded, ventilated wet-bulb temperature (WB).

c. Globe temperature (GT). This temperature is an integration of radiant and convective (the heating or cooling effects of air movement) heat transfer (heat gained or lost).

d. WBGT Index. The meter calculates this value using the following mathematical equation:

$$WBGT = (0.1 \times DB) + (0.7 \times WB) + (0.2 \times GT)$$

e. Exposure Limit (Model 960 only). The calculated exposure limit can be read off the display for each of the PHEL curves (P1 through P6 positions). The heat stress monitor uses the data of appendix B2-A to perform this calculation.

3. **Use of the WBGT Meter (RSS-220)**

a. The procedure for turning on the WBGT meter readies it for operation. The turn-on procedure is:

(1) Install the globe sensor by pushing the phone jack on the base of the sensor into the receptacle on top of the meter. Hold the globe sensor by its phone jack end, not by the black sphere. The globe can easily be damaged by squeezing, bumping, or dropping.

(2) Fill the wet-bulb water reservoir. The reservoir is accessible through the end of the tunnel marked WATER FILL. When filled, water should completely cover the sponge and be well below the level of the tunnel. Excess water can be poured out of the tunnel end. Be careful to keep the dry-bulb sensor dry. If it becomes wet, dry it with tissue or a soft cloth before operating the meter.

(3) Turn the power switch to CHECK. Listen for the sound of the aspirating fan and see digits on the display.

(4) Turn the measurement function switch to DB, WB, GT, and WBGT. Wait five minutes for the initial reading (DB). Wait three minutes for subsequent readings. Each position will give a display reading of 100.0 $\pm$ 0.2 degrees Fahrenheit, if the meter is operating properly. If the proper reading cannot be obtained, do not use the meter.

(5) Turn the power switch to ON.

b. When taking measurements, the order in which the temperatures and WBGT Index are presented in paragraph 3a (DB, WB, GT, and WBGT Index) is the order in which data must be collected to ensure optimum reliability. This is the same order in which the meter will display data as the parameter selection switch is rotated clockwise from the DB position and is the order in which the individual sensors will stabilize (most to least quickly). As each value is obtained, it shall be recorded to the nearest 0.1 degrees Fahrenheit on a heat stress monitoring sheet (see paragraph B0204c(3)(a) for recording procedures). As the meter is moved from one site to another, the meter should be at each site for 5 minutes to allow for stabilization of the first reading (DB) in the series to be taken. To determine when each sensor has stabilized, the monitor should watch the 0.1 degrees Fahrenheit digit of the display. When the 0.1 degrees Fahrenheit digit stops changing or when it oscillates between a larger or smaller value, the sensor has stabilized and the value can be recorded. (If oscillating, always record the higher of the two values.)

c. While taking readings, hold the meter about chest high, one foot away from the body. If there is airflow at the reading location, the meter should be positioned to allow the airflow to enter the left side of the meter.

4. **Use of the Heat Stress Monitor (Model 960)**

a. The procedure for readying the heat stress monitor for operation is as follows:

(1) Fill the wet bulb reservoir. Flip up the top of the reservoir filler cap. Using the supplied filler bottle, fill the reservoir to the full mark. Push the cap cover down until

it snaps in place. The black O-ring that prevents excess water from spilling out of the reservoir may constrict the flow of water onto the WB wick. Feel the wick to ensure that the wick is properly wetted.

(2) Install the globe assembly by removing it from the carrying case and inserting the globe plug into the receptacle on the top of the monitor. Be careful not to get skin oils on the globe.

(3) Turn the monitor ON. Turn the TEST switch to TEST. The display will show either "EE.E" or "88.8." The "EE.E" means that the monitor has failed the test. The "88.8" means that the electronic portion of the unit is ready for use. If the monitor fails the test, check the battery charge level. If the level is low, charge the batteries. If the batteries are not low or the monitor fails the test after charging, the meter must be repaired.

(4) Turn the TEST switch to RUN. Check top of the bar in the Battery Charge Level window. If the top of the bar is in the green section, the batteries are well charged. If the top of the bar is in the yellow section, the batteries will need recharging soon. If the top of the bar is in the red section, the batteries must be recharged before use.

b. While taking readings, hold the meter about chest high, 18 inches away from the body. If there is airflow at the reading location, the monitor should be positioned to allow the airflow to enter the left side of the unit. When taking a measurement, the order in which the temperatures and WBGT index are taken are DB, WB, GT, and WBGT. Wait five minutes after turning the monitor on until taking the initial reading. Allow the temperature to stabilize before taking the subsequent readings. Following temperature readings, position the function switch to the PHEL curve (P position) from appendix B2-A which corresponds to the routine limit, the non-routine limit, the heavy work limit, and the drills limit. The exposure limits should be checked against table B2-B-2.

5. **Use of the Automated Heat Stress System (AHSS)**

a. Viewing/Printing AHSS Data:

(1) The AHSS PC workstation displays, stores and prints the heat stress information. The information on the monitor is updated each minute and stored each hour. A dry bulb (DB) log is available which displays the DB temperature values for each location. The AHSS software allows the workspace supervisor to review the DB log and enter the appropriate comments which will also record the time of the DB log review.

(2) A complete listing of all the WBGT and PHEL curve data are stored hourly and are available for review.

(3) The AHSS provides the ability to conduct a real-time and immediate heat stress survey. The heat stress survey printout includes the current WBGT and PHEL curve stay time information. Additionally, the AHSS software performs the comparison checks to verify that DB > WB, GT ≥ DB, and GT > WBGT > WB.

b. AHSS Operations:

(1) The AHSS unit has four sensor channels, from left to right, the first is capped, the second has the DB sensor, the third has the relative humidity (RH) sensor, the fourth has the GT (black globe) sensor. The WB value is calculated from the DB and RH values. The LED lights for the AHSS unit should be red, green, green, green indicating that the AHSS unit and the three sensors are operating correctly.

(2) A DB and GT value of 32 displayed on the AHSS workstation denotes a sensor failure and the LED light will be red. Follow the procedures in the AHSS technical manual to determine if the DB or GT sensor can become operational. If not, connect a spare sensor in the appropriate DB/GT channel, re-power the AHSS unit, and arrange to have the faulty sensor repaired.

(3) A RH value of either five or 98 displayed on the AHSS workstation denotes a sensor has drifted low or high and the LED light will be red. Follow the procedures in the AHSS technical manual to re-align low/high set points using the 33% and 75% RH salt solutions. If not, connect a spare sensor in the RH channel, re-power the AHSS unit, follow the RH sensor calibration procedures, and arrange to have the faulty sensor repaired. Note that the RH salts are a disposable item with a

one-year shelf life and must be replaced each year. Ordering information is provided in the AHSS technical manual.

Refer to the AHSS technical manual for a comprehensive review of the AHSS procedures.

6. **Periodic WBGT Meter Validation**

a. Each series of WBGT meter readings shall be validated by manually calculating the highest WBGT Index obtained using the equation of paragraph 2d above. This calculation shall be performed in the remarks section of the Heat Stress Monitoring Sheet. The reported WBGT Index value from the meter reading should agree within plus or minus 0.2 degrees Fahrenheit of the calculated WBGT Index value. If such agreement is not obtained, the following causes of error shall be considered:

(1) The operator may have rushed through the measurement procedures not allowing the sensors to stabilize.

(2) The operator may have misread or recorded the values incorrectly.

(3) The meter may not be functioning properly.

If agreement is not obtained, the operator shall conduct a meter check per the appropriate technical manual. If the meter check is satisfactory, the operator shall retake the meter readings, ensuring that the meter is allowed to stabilize properly prior to obtaining readings and ensuring that values are recorded properly. If the meter check is unsatisfactory, the operator shall obtain another WBGT meter and retake the readings.

b. During reviews of heat stress monitoring sheets by the MDR, the department head, and other supervisors, the temperature and WBGT Index values should be spot-checked to determine obvious errors. The following rules of thumb should be applied:

(1) WB temperatures must be less than DB temperatures (WB < DB).

NOTE:

If the WB temperature equals the DB temperature, the wick over the WB sensor is probably dried out. Check that there is water in the WB reservoir.

(2) GT for each set of readings should be greater than or equal to DB temperature for the same set of readings (GT $\geq$ DB).

(3) WBGT Index must be greater than WB temperature and less than the GT (WB <WBGT < GT).

(4) The higher the overall heat stress, the more important it is to periodically check the meter's WBGT Index value by manually calculating the WBGT Index. It is the reliability of the individual data and WBGT Index which determines the reliability of the exposure limit from the PHEL chart or table.

7. **Emergency Environmental Monitoring Equipment Method.**

The emergency environmental monitoring equipment method discussed here will almost always significantly underestimate the level of heat stress; this shortfall will result in an increased risk of personnel suffering heat injury. When there are no operable WBGT meters aboard ship, there are two alternative monitoring methods that may be used while the ship is underway. Motorized psychrometers (NSN 1H-6685-00-936-1389), carried aboard ships for meteorological purposes or commercially available hygrometers. These psychrometers only measure DB and WB temperatures. They do not have a globe thermometer and therefore cannot account for radiant and convective heating or cooling. Hence, all of the components in the WBGT Index equation are not available to calculate the WBGT Index. If using the motorized psychrometric DB and WB temperatures must be measured with the psychrometer shield in its proper position (the flared-open end of the shield must be facing away from the psychrometer). GT can be approximated by taking the difference (ΔT) between the DB temperature and the GT under similar plant operating conditions (power level, number of operating boilers, and approximately the same load on the propulsion plant) when a full set of WBGT meter measurements were obtained. This difference (ΔT) should be added to the DB temperature measured with the psychrometer. For example:

Previous DB	-	Previous GT	=	ΔT
98.3	-	110.4	=	12.1

Psychrometer DB	-	Psychrometer WB	=	Estimated GT(DB+ ΔT)
99.1	-	83.6	=	99.1 + 12.1 = 111.2

Using the formula:

WBGT = (0.1 x DB) + (0.7 x WB) + (0.2 x GT)

WBGT = (0.1 x 99.1) + (0.7 x 83.6) + (0.2 x 111.2)

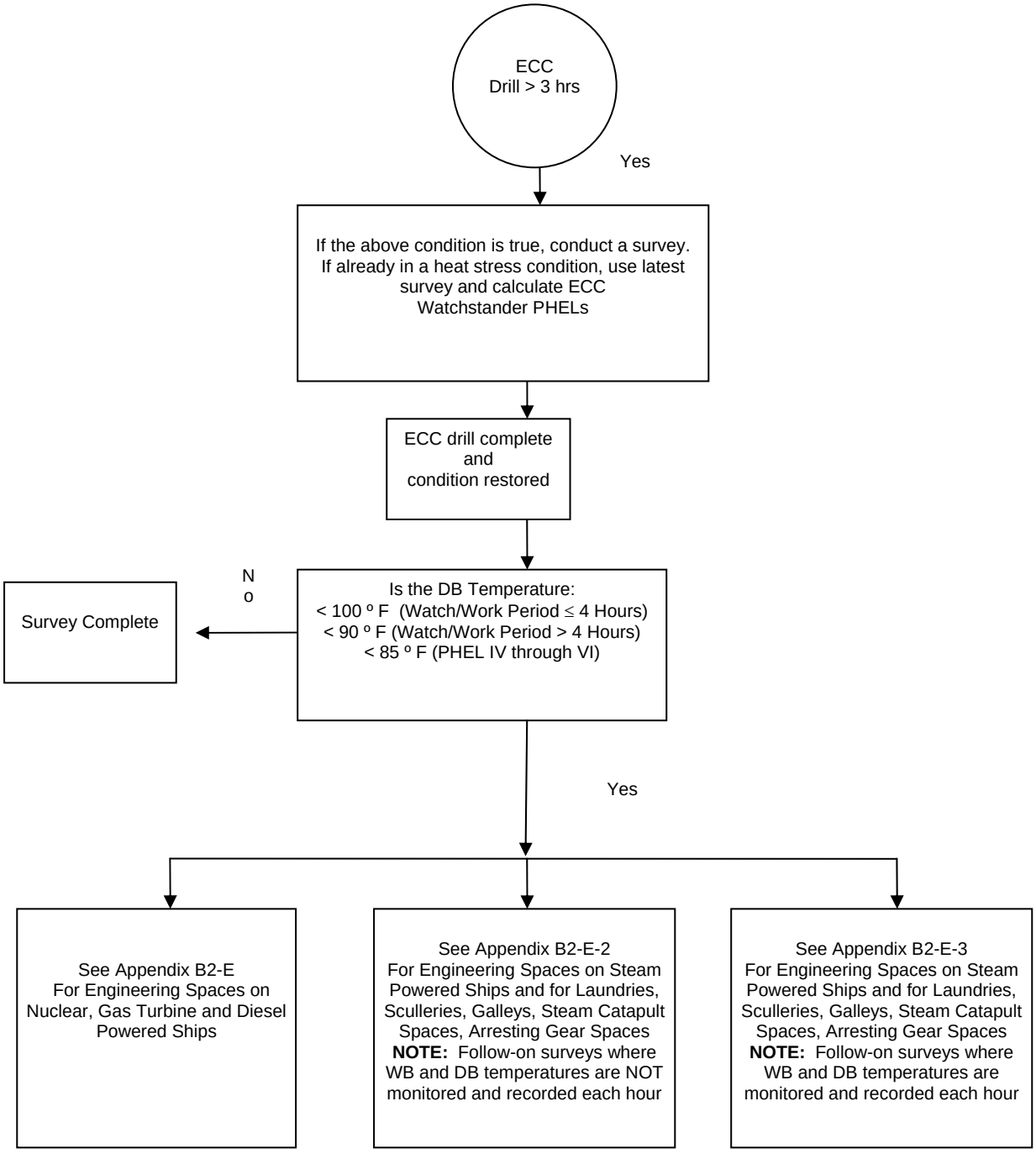
WBGT = 90.7

The WBGT Index values obtained by this strictly emergency monitoring method should be used with the PHEL chart (figure B2-B-1) or tables (tables B2-B-2 and B2-B-3). The resultant exposure limits will be approximations only.

Records should indicate whenever the emergency environmental monitoring equipment method was used. A casualty report shall be submitted. When reporting meter failure, give the serial and model numbers and describe the problems encountered.

Appendix B2-D

HEAT STRESS DECISION DIAGRAM



Appendix B2-E

TIME WEIGHTED MEAN (TWM) WBGT VALUES

Time Weighted Mean (TWM) WBGT Values. The TWM WBGT is intended for use in especially hot environments where reduced stay times have been imposed on watchstanders. The TWM WBGT is an optional provision, for use if an air-conditioned booth or cooler space is available for personnel to spend time in the cooler climate and afford some relief from the heat in the space. When the TWM is used it changes the WBGT value for that individual and increases the length of time spent at watch station. Ships that have this ability may properly calculate the new WBGT value using the following equation:

$$\text{Time (booth)} = \frac{[\text{WBGT (WATCH STATION)} - [\text{WBGT (desired)}] \times 60}{[\text{WBGT (watch station)} - \text{WBGT (booth)}]}$$

For example: Engineering spaces on a steam-powered ship in the Indian Ocean are on a four-hour watch rotation. The temperature on a hanging DB thermometer in a main space measured 101°F during the latest heat-stress survey:

Burnerman WBGT = 92, PHEL = II, Stay time = 4:10
Lower Levelman BGT = 92; PHEL = III; Stay time = 3:30
Console Booth WBGT = 80; PHEL = I; Stay time = 8:00

The lower levelman has a stay time less than four hours while other watch stations have stay times that are equal to greater than four hours. The engineering office decides to incorporate a TWM WBGT for the lower levelman to maintain a four-hour watch for all watchspace personnel. He/she looks up the WBGT value (in the PHEL Time Table in appendix B2-A) to achieve a four-hour stay time (90 WBGT = stay time of four hours) and does the calculation. The time that the lower levelman must spend in the cool booth each hour to achieve a four-hour watch would be calculated as follows:

For the Lower Levelman:

$$\text{Time (booth)} = \frac{[\text{WBGT (watch station)} - [\text{WBGT (desired)}] \times 60}{[\text{WBGT (watch station)} - \text{WBGT (booth)}]}$$

The 90 WBGT value is from the PHEL Table in appendix B2-A.

$$\text{Time (booth)} = \frac{[92 - 90] \times 60}{[92-80]} = 10 \text{ minutes}$$

TWM WBGT information shall be documented on the heat stress survey sheet.

CHAPTER B3

HAZARDOUS MATERIAL CONTROL AND MANAGEMENT (HMC&M)

B0301. DISCUSSION

a. To attain and maintain operational effectiveness, Navy ships require specified types and quantities of hazardous material (HM). Great care must be taken in handling, using, and storing HM to prevent injury to personnel, damage to equipment, or harm to the environment. Risks associated with HM are greater aboard ship than ashore because of the limited number, confined nature, and "at sea" environment of shipboard spaces. Consequently, both special precautions and an effective HM program are needed. The maintenance of safe and healthful working conditions for HM is a chain of command responsibility. Implementation begins with the commanding officer and extends to the individual Sailor.

b. In order to comply with Chief of Naval Operations (CNO) direction, all U.S. Navy ships are required to implement the consolidated hazardous material reutilization and inventory management program (CHRIMP). This program is a HM control and management plan calling for all HM to be centrally controlled onboard ships. CHRIMP requires the establishment/installation of hazardous material minimization centers (HAZMINCENs) on each ship for the centralized management of all shipboard HM, used and excess HM and empty HM containers. The HAZMINCEN is an issue/reuse site with HM inventory tracking software.

c. Execution of CHRIMP through the establishment of a HAZMINCEN should reduce on board quantities of HM through inventory control and management, in accordance with environmental, safety and health requirements. However, sufficient material should be available on board after these efforts to meet ship operational, habitability, and maintenance requirements. The ship must be able to perform the preventive, corrective, and facilities maintenance in support of ship operations.

d. This chapter addresses general management requirements and personnel responsibilities for HMC&M. Chapters C23 for surface ships and D15 for submarines contain specific management guidance and safety precautions for HMC&M.

e. Commands having dental facilities shall reference B3-1 for direction in implementing mercury control in affected spaces.

f. For Submarines. This chapter and chapter D15 provide guidance for all HM, including HM that contains atmosphere contaminants per reference B3-2. Some of these contaminants may be released to the submarine atmosphere during operations involving the use of the HM. When a HM is a source of submarine atmospheric contamination, chapter D15 provides additional controls on the storage and use of this material.

g. The following definitions apply to Navy HMC&M:

(1) **Hazardous Material (HM)** - Any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a hazard to human health or the environment during use, handling, storage, transportation, or spill. Excluded are those materials cited in reference B3-3, such as materials that do not require a material safety data sheet (MSDS), Food, Drug and Cosmetics Act items (e.g., packaged personal care products), articles (e.g., packaged solder or brazing alloy), ionizing (e.g., check sources for radiation monitors) and non-ionizing radiation (e.g., radiofrequency heat sealers, microwave or laser products) and biological hazards (e.g., products containing living organisms).

Materials that require special handling and disposal procedures include ammunition, weapons, explosives, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical waste, infectious materials, bulk fuels, asbestos, lead, and radioactive materials. Guidance/direction for these materials can be found in other related documentation.

NOTE:

Even though the above items may not be considered or handled as HM, submarine atmosphere control requirements in chapter D15 may apply.

(2) **Used Hazardous Material** – Used HM is material that has been used in a shipboard process or maintenance action and

for which there is no further, immediate use on board the ship possessing the material. Such material may ultimately be used on another ship, within the shore establishment, for the same purpose or a purpose other than that for which it was initially manufactured, or by commercial industry.

(3) **Excess Hazardous Material** – Excess HM is *unused* material in unopened, properly sealed containers for which there is no further, immediate use on board the ship possessing the material. Such material may ultimately be used on another ship, within the shore establishment, for the same purpose or a purpose other than that for which it was initially manufactured, or by commercial industry.

NOTE:

It is the responsibility of the shore receiving facility to determine if used/excess HM offloaded is reused or disposed of as hazardous waste (HW). See reference B3-4 for a definition of HW.

(4) **Consolidated Hazardous Material Reutilization Inventory Management Program (CHRIMP)** – A HM control and management program that requires all hazardous material (used and excess HM and all empty HM containers) to be centrally controlled onboard ships and submarines. CHRIMP requires the establishment/installation of HAZMINCENs. CHRIMP includes centralized inventory management, procurement, storage, issue/receipt/reissue, and collection/consolidation/offload of HM.

(5) **Hazardous Material Minimization Center (HAZMINCEN)** utilizes facilities, equipment, and procedures to execute CHRIMP. HAZMINCEN designs can vary greatly, depending on the size of the ship, mission, and requirements for HM.

The smallest ships (submarines, minesweepers, patrol craft) often require little HM and are too small to include a dedicated HAZMINCEN storeroom or office. In these instances, HM is stored in work-center lockers, and centrally managed/controlled in the Supply Department.
Other small ships (frigates, cruisers, destroyers) have only a small flammable storeroom and utilize lockers for other HM. HM on these ships can be issued from the flammable storeroom, and

centrally managed/controlled in the supply department. On these smaller ships, there usually is insufficient space to allow for a dedicated HM consolidation space. Consolidation takes place in the flammable storeroom.

On larger platforms (amphibious class ships, aircraft carriers), the ship is large enough to support a separate HAZMINCEN office, multiple HM storerooms, issue room(s), and a consolidation space.

(6) A **Material Safety Data Sheet (MSDS)** is a document that contains on the potential health effects of exposure to chemicals, or other potentially dangerous substances, and on safe working procedures when handling chemical products. It is an essential starting point for the development of a complete health and safety program. It contains hazard evaluations on the use, storage, handling and emergency procedures related to that material. The MSDS contains much more information about the material than the label and it is prepared by the supplier. It is intended to tell what the hazards of the product are, how to use the product safely, what to expect if the recommendations are not followed, what to do if accidents occur, how to recognize symptoms of overexposure, and what to do if such incidents occur.

(7) The **Hazardous Material Information Resource System (HMIRS)** is a Department of Defense (DoD) automated system developed and maintained by the Defense Logistics Agency. HMIRS is the central repository for MSDS for the United States government military services and civil agencies. It also contains value-added information input by the service/agency focal points. This value-added data includes hazard communication warning labels and transportation information. HMIRS provides this data for hazardous materials purchased by the federal government through the DoD and civil agencies. The system assists federal government personnel who handle, store, transport, use, or dispose of hazardous materials. HMIRS can be accessed via http://www.dlis.dla.mil/hmirs/. HMIRS MSDS contain hazard characteristic codes (HCC) that can be used to determine proper storage for HM.

(8) The **Ships Hazardous Materials List (SHML)** is the master HM authorized use list for surface ships. The list was developed to ensure only approved HM and corresponding units of issue authorized for use aboard ship are brought aboard ships,

to preclude stocking HM not needed aboard, and to match allowed quantities with maintenance requirements.

(9) The **Material Management Indicator (MMI)** code on the SHML that identifies which HM the HAZMINCEN controls. A SHML MMI code of "A" indicates the material is authorized for shipboard use. A SHML MMI code of "P" indicates material is prohibited for shipboard use and should not be stored or used aboard ship. A SHML MMI code of "R" indicates material having shipboard use restrictions. A SHML MMI of "Y" indicates the HAZMINCEN shall store and centrally control the HM. A SHML MMI of "N" indicates the HM is a low risk and does not require HAZMINCEN control.

(10) The **Hazardous Inventory Control System for Windows (HICSWIN)** is the principal software system used on Navy surface ships for implementing the Navy's consolidated hazardous material reutilization and inventory management program (CHRIMP)

(11) The **Submarine Hazardous Material Inventory and Management System (SHIMS)** is a menu driven HM inventory and management tool for use aboard submarines to easily track, identify storage location, and determine which HM has been approved for procurement and use. SHIMS allows submarines to be in full compliance with this instruction and applicable atmospheric control requirements. It assists the operator in the systematic, positive control and management of HM. SHIMS's provides:

(a) A standardized tool to assist in submarine HMC&M compliance, inventory management, and shelf-life management;

(b) A standardized tool to implement submarine atmospheric control requirements;

(c) A single data source for SMCL and MSDS information; and

(d) Standard reports, references and output that meet requirements of this instruction and references B3-2, B3-4 and B3-5.

(12) The **Submarine Material Control List (SMCL)** is a Navy data application that lists the authorized HM for use on submarines as established by reference B3-2.

(13) **Shipboard Safety Equipment Guide** - The Naval Safety Center Afloat Safety Program Directorate prepared this guide to provide national stock numbers for common safety equipment and personal protective clothing approved for surface ship and submarine use.

B0302. SURFACE SHIP HMC&M

a. Responsibilities

(1) **The Commanding Officer shall:**

(a) Assign the responsibility for implementation of the consolidated hazardous material reutilization inventory management program (CHRIMP) afloat through the operation of a hazardous material minimization center (HAZMINCEN) to the shipboard supply department. Augment the manning of the responsible department as necessary to accomplish CHRIMP.

(b) Appoint/assign, in writing, a HM coordinator. The HM coordinator shall be a graduate of the Afloat HM Coordinator Course or equivalent supply corps officer training. (See HM training paragraph.) Appointment shall be a person of ranking in the following order of preference:

1. A commissioned officer within the supply department,

2. A chief or leading petty officer (see note).

NOTE:

Ships and afloat activities specifically designated by the type commander in which the number of assigned officers is limited and appointment would pose an excessive burden to the ship may assign a chief or leading petty officer as HM coordinator.

(c) Appoint/assign a HM supervisor/lead petty officer, in writing, to operate the HAZMINCEN. The HM supervisor/lead petty officer shall be a graduate of the HMC&M Technician (secondary Navy enlisted classification (SNEC) code 9595) Course (see HM training paragraph).

(d) Annually, prepare and submit a report of HAZMINCEN operational efficiency to the chain of command. Report shall be based upon HICSWIN/R-Supply data and report the following: a) HM obtained onboard via ship procurement (Cost), b) HM obtained on-board via open purchase request, c) HM obtained on-board via reuse (from other ships or shore CHRIMP facilities), and d) HM offloaded.

(e) Approve, by signature, ship's hazardous material list (SHML) feedback reports (SFRs). A designated O-5 or above may be appointed, in writing, to approve SFRs for the commanding officer.

(f) Ensure compliance with OPNAV transfer and disposal policy guidance provided in reference B3-4, chapter 19, appendix L. Report to the fleet commanders by message, information to the chain of command, any conditions or system/equipment malfunctions that results in an **overboard discharge** of HM into or upon the marine environment per reference B3-4 and applicable operations orders (OPORDs).

NOTE:

The requirements detailed herein shall not preclude the overboard discharge of HM during an emergency where failure to discharge would clearly endanger the health or safety of shipboard personnel or would risk severe damage to the ship.

(2) **The Executive Officer shall:**

(a) With department heads, semi-annually review the list of HM to ensure that CHRIMP efforts are optimized to minimize HM stowage locations and eliminate excessive or unauthorized quantities of HM.

(b) Assign sufficient personnel to the HAZMINCEN to accomplish CHRIMP and ensure an individual with SNEC 9595

qualification is operating the HAZMINCEN. Use the HM work-center listed in the activity manpower document (AMD) as guidance for HAZMINCEN manning. If the ship's AMD does not list a HM Work-center,

(c) HAZMINCEN manning guidance should be obtained from the type commander.

(d) Upon request from the HM coordinator, approve work-center HM storage locations/lockers in writing, as applicable, to support daily evolutions.

(e) Receive and review the HAZMINCEN delinquent containers report generated from HICSWIN. Ensure action is taken to correct outstanding/repeated delinquencies.

(f) Ensure supply and safety officers make monthly satellite locker inspections and quarterly storeroom inspections and are taking action to correct deficiencies.

(g) Ensure that HM needed for embarked units (Marines, airwing squadrons, special forces, etc.) is authorized for use on board ship and that there is an agreement, in writing, detailing responsibilities of ships company and the embarked unit. The agreement shall address procurement, storage, reorder and offload. Note: Sufficient notice is required to allow the ship to order and receive the hazardous material for the embarked unit.

(h) Ensure HM brought on board by contractor and shipyard representatives is controlled and offloaded in accordance with contract requirements.

(i) Annually review the ship's training plan to ensure that HM awareness training is included.

(j) Ensure all supervisors (department heads, division officers and petty officers) annually receive the HM awareness training. Ensure supervisors provide HM awareness training to all hands.

(3) **Department Heads shall:**

(a) Assist the executive officer in a semi-annually review of the list of HM to ensure that CHRIMP efforts are optimized to minimize HM stowage locations and eliminate excessive or unauthorized quantities of HM.

(b) Ensure that HM retained within their work-centers is required for the operations and maintenance of assigned equipments and does not exceed the quantity needed to satisfy operational needs/requirements.

(c) Ensure that department personnel are available to receive annual HM awareness training.

(d) Ensure used or excess HM is properly turned into the HAZMINCEN for turn over to the shore activity offload personnel.

(4) **The Supply Officer/HM Coordinator/HM Supervisor shall:**

(a) Operate the HAZMINCEN in accordance with guidance in this chapter and in chapter C23. Provide control and inventory management of designated shipboard HM. Ensure receipt, stowage, consolidation, issue, inventory and accountability of all HM used on board.

(b) Weekly, prepare and submit a HAZMINCEN operation summary report to the chain of command. Report to include:

1. Listing of new HAZMAT requirements (lists new HM line items and provides status of the SHML feedback report (SFR) (when SFR was sent and what is the answer).

2. Summary of results from storeroom and satellite locker spot checks (Including size of sample taken, results, HICSWIN/RSUPPLY accuracy, and reason for inaccuracies/deficiencies).

3. Report of NIS (not in stock, but carried) and N/C (not carried item) (Any item on this list must also contain the name of the person requested it, the reason it was

requested, and the amount that was requested. Report also must provide the requisition number for the material, reason why the material is NIS or N/C, and the status of resolving the NIS and/or N/C issue).

4. Summary of HM training conducted (in addition to general and professional training).

(c) Quarterly, prepare and submit a report of HAZMINCEN operational efficiency to the CO. Report shall be based upon HICSWIN data and report the following: a) HM obtained on board via ship procurement (cost), b) HM obtained through open purchase request, c) HM obtained on board via reuse (from other ships or shore CHRIMP facilities), d) HM offloaded.

(d) The HM Coordinator shall be a graduate of the Afloat HM Coordinator Course or equivalent supply corps officer training. The HM supervisor/lead petty officer shall be a graduate of the HMC&M Technician (SNEC 9595) Course, (see HM training paragraph).

(e) Provide quarterly training to HAZMINCEN personnel on proper handling, issuing, labeling, stowage, receipt processing, inventories, spill response and disposal procedures; training based on chapter C23, chapter 4 of reference B3-6 and reference B3-7.

(f) Ensure HM training is provided quarterly to division/work-center personnel responsible for maintaining in-space storage lockers. Training should include proper inventorying, marking, stowage and the use of MSDS.

(g) Ensure a MSDS is on file (either hard copy or on CD-ROM) for all types and brands of HM taken aboard. Ensure that hard-copy MSDSs are readily accessible to all hands.

(h) Ensure only HM authorized for shipboard use by the Ship's Hazardous Material List (SHML) is requisitioned, or if necessary to do so, that a SHML feedback report (SFR) is promptly submitted (See chapter C2303b). Ensure SHML feedback reports (SFRs) are signed by the commanding officer (or a designated O-5 or above) and transmitted to NAVCIP for processing.

(i) Work with stock control officer to ensure all HM orders are approved by the HAZMINCEN prior to ordering or signing all purchase requests for HM items.

(j) Identify, in writing, locations and quantities of all HM/excess HM stored aboard ship and provide a list to the executive officer, department heads, gas free engineer, damage control assistant (DCA), fire marshal, safety officer and senior medical officer.

(k) Execute the following inspections, and take corrective action for all deficiencies found. Inspect the HM program in accordance with reference B3-6, section 8202, hazardous material division check off list. Inspect for locker/storeroom condition, HM compatibility, labels, corrosion, leaks, bulging cans/drums, and shelf life.

1. Monthly satellite locker inspections. Coordinate/conduct inspections with the safety officer. Additional locker inspection guidance is found in reference NSTM B3-7.

2. Monthly spot-check of HM practices of division personnel. Choose one division (randomly) which uses HM. Coordinate/conduct spot-checks with the safety officer. Ensure all divisions are checked at least twice per year.

3. Quarterly storeroom inspections. Coordinate/conduct with the safety officer.

4. Annual ship-wide physical inventory of all HM (including lockers and HAZMINCEN storerooms/spaces). Compare this inventory to the SHML and take appropriate action on all differences.

(l) Approve work-center HM storage locations/lockers in writing, as applicable, to support daily evolutions. Coordinate approval of locker locations with the safety officer, DCA, and XO.

(m) Act as the ship’s single point of contact in the offload of used/excess HM. Comply with the following:

1. Receive and segregate/consolidate used HM and ensure contents of offloaded HM are labeled/marked in accordance with chapter C23.

2. Supervise document preparation for offload of used/excess HM.

3. Prior to getting underway, ensure that no HM remains on the pier.

4. Ensure all contractor and shipyard representatives offload all HM brought on board following completion of their work.

(n) Ensure personnel assigned to the HAZMINCEN are trained on duties and responsibilities prior to assuming these duties. Ensure at least the number of persons specified in the ships manning document are assigned to operation the HAZMINCEN.

(o) Maintain HICSWIN.

(p) Manage embarked unit (Marines, airwing squadrons, special forces, etc.) HM in accordance with the following:

1. Ensure embarked units do not bring onboard prohibited HM; Embarked unit HM shall be screened against the ships T-SHML to ensure it is authorized for use onboard ship. Embarked units shall provide a valid requirement for material needed onboard ship (i.e., maintenance procedure, technical manual, etc.).

2. Ensure embarked units submit requirements for hazardous material to the ship prior to embarking. Sufficient notice shall be given to allow the ship to order and receive the hazardous material.

3. Ensure that the embarked unit only brings unique hazardous material on board that is authorized by the ship. In this case, ensure the embarked unit takes responsibility for the offload of the material (upon departure of the embarked unit or aircraft).

(q) Ensure HAZMINCEN is equipped with an oil and hazardous substance (OHS) spill kit. Ensure DCA is aware of his responsibility to maintain and replenish spill kit material. See B0304.

(r) Ensure HAZMINCEN pollution prevention afloat (P2A) equipment is operational, and being used safely in accordance with instructions.

(5) **Division Officers shall**:

(a) Ensure that only NAVSEA-approved, in-space storage lockers are used and that locations/installations are approved by the HM coordinator, safety officer, DCA and XO. Ensure lockers are installed and labeled in accordance with reference B3-7.

(b) Ensure that HM retained within their work-centers is specific to the operations and maintenance of assigned equipment. No more than a seven-day supply of HM issued by the HAZMINCEN to the work-center may be retained in work-center spaces. Longer storage to address special needs must be authorized, in writing, by the HM Coordinator, DCA, safety officer, and XO.

(c) Ensure HM training is provided quarterly to division personnel responsible for maintaining in-space storage lockers.

(d) Ensure used or excess HM is properly returned to the HAZMINCEN.

(e) Ensure that approved personal protective clothing and equipment are available for HM operations or incidents and personnel are trained in their proper use and maintenance as described in reference B3-8. Follow specific direction on applicable PMS cards and MSDSs.

(f) Make division personnel available to receive annual HM awareness training. Incorporate HM training into normally scheduled weekly divisional training. Ensure that upon reporting on board and annually thereafter, all personnel are educated on HMC&M (ordering, issuing, reutilization, handling, storing, using, disposal, and spill response)

(g) Mark any polychlorinated biphenol (PCB)-containing electrical or electronic components per reference B3-9 and associated NAVSEASYSCOM-issued PCB advisories.

(6) **The Safety Officer shall:**

(a) Approve work-center HM storage locations/lockers. Coordinate with the HAZMINCEN Division.

(b) Spot check monthly, in conjunction with the master-at-arms force and the HAZMINCEN Division, to ensure day-to-day compliance with CHRIMP requirements. Spot checks shall include checking for improper stowage and use of HM in the HAZMINCEN and work-center lockers. Ensure all divisions are checked at least twice per year.

(c) Coordinate the execution of the following inspections with the HAZMINCEN division:

1. Monthly satellite locker inspections.

2. Quarterly storeroom inspections.

(d) Ensure that the CHRIMP/HAZMINCEN program is evaluated annually for compliance and effectiveness.

(e) Report all HM mishaps as required by reference B3-10.

(7) **The Afloat Environmental Protection Coordinator (AEPC) shall** perform the functions described in reference B3-4. The AEPC shall ensure pollution prevention afloat (P2A) equipment is operational and in use.

(8) **The Damage Control Assistant (DCA) shall:**

(a) Coordinate HM spill response drills with the HAZMINCEN division as necessary. See section B0304.

(b) Approve work-center HM storage locations/lockers in writing, as applicable, to support daily evolutions. Coordinate approval of locker locations with the HAZMINCEN division.

(c) Maintain and replenish spill kit material.

(9) **The Medical Department Representative (MDR) shall**:

(a) Assist the HM coordinator/HM supervisor and work-center supervisors in training personnel regarding health information and personal protective equipment requirements for the HM they are using.

(b) Maintain a complete MSDS file. This may be on CD-ROM or hardcopy.

(10) **Division Supply Petty Officers/Repair Parts Petty Officers shall** request HM from the HAZMINCEN and shall ensure before HM is ordered that a valid requirement exists (specifically required by a maintenance procedure or other shipboard operation). HM listed on the SHML shall be used to avoid open procurement of HM. Submit an SFR to HAZMINCEN personnel whenever requesting HM not authorized by the SHML.

(11) **Embarked Unit Supply Petty Officers/Repair Parts Petty Officer shall:**

(a) Execute, in writing, an agreement detailing responsibilities of ships company and the embarked unit. The agreement shall address procurement, storage, reorder and offload.

(b) Submit requirements for hazardous material to the ship prior to embarking. Provide a valid requirement for material needed on board ship (i.e., maintenance procedure, technical manual, etc.). Ensure HM is screened against the ships T-SHML to ensure it is authorized for use on board ship. Sufficient notice shall be given to allow the ship to order and receive the hazardous material.

(c) Offload any HM (not supplied by the ship) brought onboard in accordance with applicable requirements.

(12) **Work-center Supervisors shall**:

(a) Ensure that required personal protective clothing and equipment are maintained and used. See reference B3-8, preventive maintenance system (PMS) and MSDS instructions.

(b) Ensure that prior to initial use or handling any HM, work-center personnel have been trained on the hazards associated with that material and are familiar with what an MSDS is, what it contains, and where a copy is available for review. Train work-center personnel in the use of MSDS.

(c) Ensure that a valid maintenance requirement exists for any HM item not listed in the SHML and initiate a SFR.

(d) Remove unauthorized HM from the work-center.

(e) Ensure a copy of the hazardous material user's guide (HMUG) is available for use by work-center personnel.

(f) Ensure work-center HM lockers are secured, labeled and have contents identified and approved by the XO, safety officer, DCA, and HAZMINCEN division. Locker installation shall comply with chapters B3, C23 and reference B3-7.

(13) **All Hands shall**:

(a) Properly stow or return HM to approved locker or the HAZMINCEN upon completion of use or no later than the end of the workday.

(b) Properly use and handle HM in accordance with the applicable MSDS and reference B3-8.

(c) Collect and segregate any residue resulting from use of HM issued from the HAZMINCEN for turn-in to the supply department/HAZMINCEN.

(d) Report any spills of HM to the officer of the deck, and/or damage control central/central control station.

(e) Annually complete HM awareness training.

b. HMC&M Program Elements. The following elements are essential for effective surface ship HMC&M. The requirements associated with these elements are described in C23.

(1) Centralized inventory management/tracking.

(2) Requisitioning and receiving authorized HM.

(3) HM container labeling.

(4) Storage of HM.

(5) Controlling HM issue/re-issue/return.

(6) HM container compatibility.

(7) Consolidation/offload/disposal of used or excess HM.

(8) HM use and handling requirements.

(9) Training (see paragraph c below)

c. HM Training

(1) The HM coordinator shall normally receive en route training at the Navy Supply Corps School's basic and department head courses. HM coordinators who are not supply corps officers shall attend the afloat HM Coordinator Course (A-8B-0008) taught by the Naval Occupational Safety and Health and Environmental Training Center (NAVOSHENVTRACEN). The course shall be completed prior to, or within six months of, being assigned this duty.

(2) The HM Supervisor/lead petty officer, and other assigned personnel as required by the activity manpower document, shall be a graduate of the HMC&M Technician (SNEC 9595) course (A-322-2600 or A-322-2601). At a minimum the HM supervisor shall also be a graduate of the CHRIMP/HICS Technician course. Both courses are taught by the NAVOSHENVTRACEN.

B0303. SUBMARINE HMC&M

a. Responsibilities

(1) **The Commanding Officer shall:**

(a) Report all HM mishaps as required by reference B3-10.

(b) Report to the fleet commanders by message, information to the chain of command, any conditions or system/equipment malfunctions that results in an overboard discharge of HM into or upon the marine environment per reference B3-4 and applicable operations orders (OPORDs).

(c) Ensure that spills of HM are handled per guidance specified in references B3-27 and B3-28.

(2) **The Executive Officer shall:**

(a) Grant written permission to carry on board any restricted HM during an underway period. Refer to chapter D15 and reference B3-2 for definitions of submarine material control usage categories.

(b) Ensure assigned personnel follow the conditions under which restricted or limited HM are stored or used on board to minimize the release (off-gassing, mists, or vapors) of potential atmospheric contaminants into the submarine. Restricted material may not be used on board during an underway period.

(c) Ensure restricted (R) and HM items pending for classification are not used on board while underway.

(3) **Department Heads shall:**

(a) Ensure that HM retained within their work-centers is unique to the operations and maintenance of assigned equipment and does not exceed the quantity needed to satisfy operational requirements.

(b) Ensure used or excess HM is properly returned to the supply officer for turn over to the shore activity.

(c) Report all items found with a restricted (R) or limited (L) use code that have not been logged in the submarine material control log to the supply officer for logging, labeling, and assignment of approved storage location, or disposal.

(d) Report all items found that are not listed (categorized) in the submarine material control list (SMCL) to

the supply officer. Items not listed in the SMCL are prohibited per paragraph D1502(a).

(e) Ensure that restricted items authorized for in port use only are removed from the submarine when no longer needed. Inform the supply officer of their removal to allow documentation in the submarine material control log. Obtain written permission from the executive officer to retain on board restricted items during underway.

(f) Ensure that all HM in their custody are used, handled, and stowed per the requirements of chapter D15.

(4) **The Supply Officer/HM Coordinator shall:**

(a) Ensure that management of shipboard HM follows procedures outlined in this chapter and chapter D15.

(b) Ensure an MSDS is on file (either hard copy or on CD-ROM) for all types and brands of HM taken aboard. Ensure that hard-copy MSDSs are readily accessible to personnel and their supervisors. Maintain the submarine hazardous material inventory and management system (SHIMS) which contains MSDS information. Submit hard copies of MSDSs which are not on the SHIMS system to Naval Surface Warfare Center, Carderock Division, code 634.

(c) Ensure no prohibited HM is brought on board.

(d) Maintain the submarine material control log per paragraph D1502d.

(e) Ensure all HM brought on board is authorized for storage and use on board by the Submarine Material Control List (SMCL). Affix an atmosphere contaminant tag (appendix D15-C) to all HM containers upon issue and mark with pre-designated usage category for any material that is a restricted (R) or limited use (L) HM. Atmosphere control tags can be printed from SHIMS.

(f) Initiate an investigation of any item suspected of being an atmosphere contaminant per the procedures of reference B3-2 and submit a SMCL feedback report per chapter D-15.

(g) Ensure that all restricted (R) and limited use (L) items are inventoried every six months or prior to a change of command.

(h) Review the submarine material control log weekly in port and monthly underway.

(i) Obtain commanding officer's written authorization prior to open purchasing any HM.

(5) **The Medical Department Representative shall**:

(a) Assist work-center supervisors in training personnel regarding health information and personal protective equipment requirements for the HM they are using.

(b) Provide medical assistance in the event of a HM spill or mishap involving HM. Use MSDS information in SHIMS provided by the supply officer.

(6) **Division Officers shall**:

(a) Ensure when HM is transferred into other containers the new containers are properly marked with the information specified in paragraph D1502d.

(b) Ensure approved personal protective clothing and equipment are available for HM operations or incidents and personnel are trained in their proper use and maintenance.

(c) Ensure personnel are made available to receive required HM training as detailed in section B0303c.

(d) Mark any PCB-containing electrical or electronic components per section D1506.e.

(7) **The Damage Control Assistant shall c**oordinate HM spill response drills with the HAZMINCEN division as necessary. See section B0304.

(8) **Repair Parts Petty Officers shall** ensure before HM is ordered, that a valid requirement (specifically required by a maintenance procedure or other shipboard operation) exists. Standard stock HM shall be used whenever possible to avoid procurement of open purchased HM.

(9) **Work-center Supervisors shall**:

(a) Ensure that approved personal protective clothing and equipment are maintained and utilized.

(b) Ensure that prior to using or handling any HM, work-center personnel have been trained on the hazards associated with that material and are familiar with what an MSDS is, what it contains, and where a copy is available for review.

(c) Ensure that a valid maintenance requirement exists for any HM item not listed in the SMCL and initiate a SMCL feedback report (SFR) requesting material certification in accordance with the requirements of reference B3-1, chapter 7.

(10) **All Hands shall**:

(a) Ensure that HM is returned to appropriate stowage upon completion of use or at the end of the workday, whichever is earlier.

(b) Follow instructions provided for the proper use of HM.

(c) Collect and segregate any used HM for proper offload per chapter D15.

(d) Report any spills of HM to the duty officer (in port) or the chief of the watch (underway).

(e) Report any violation of HM use, storage, and handling precautions to the supervisor for resolution/correction.

(f) Be alert to prevent the on board storage and use of restricted material during underway operations without prior approval/authorization from the executive officer. Ensure limited material is being used per SMCL guidance.

b. Hazardous Material Control and Management Elements. The following elements are essential for effective submarine HM control and management:

(1) Proper use of HM per SMCL guidance (see chapter D15).

(2) Designation of compliant storage for HM (see chapter D15).

(3) Controlling HM purchase (including type and quantity of material required), receipt, and issue to avoid accumulation of HM (see chapter D15).

(4) Avoiding open purchases of HM (see chapter D15).

(5) Following approved safety standards for the use of HM (see chapters B1, B3, B10 and D15 for specific requirements on use of HM).

(6) Reutilization of HM to reduce the amount of used HM generated (see chapter D15).

(7) Collection, segregation, and disposal of used or excess HM (see chapter D15).

(8) Responding to HM emergencies (see B0304).

(9) Obtaining and providing MSDSs for on board HM (see chapter D15).

(10) Training (see B0303c).

(11) Proper HM labeling (see chapter D15).

c. Training

(1) The HM coordinator receives en route training at the Navy Supply Corps School Basic Course (A-8B-0008).

(2) The leading SK shall be a graduate of the HMC&M Technician (SNEC 9595) Course (A-322-2600).

(3) Personnel expected to combat an emergency involving HM shall receive training on HM emergency procedures.

B0304. OIL AND HAZARDOUS SUBSTANCE (OHS) SPILL RESPONSE GENERAL (Surface and Submarine Applicable) REQUIREMENTS:

Because of the extremely hazardous nature of many HM used aboard ships, only personnel trained by the DCA shall respond to HM spills. Refer to appendices B3-A and B3-B. Reporting requirements for a HM spill which goes over the side are found

in reference B3-4, chapter 19. Additional response procedures for specific situations are provided in documents found in references B3-11 through B3-17 and B3-27 and B3-28 for submarines.

SURFACE SHIP REQUIREMENTS:

a. Responsibilities

(1) **The Damage Control Assistant shall:**

(a) Develop and implement a spill contingency plan (SCP), using the Navy's shipboard oil and hazardous substance (OHS) spill contingency plan guide per reference B3-4 and B3-13.

(b) Train and supervise ship's damage control teams (and fire department, if used aboard) in combating spills of HM and oil.

(c) Provide training to divisions regarding reporting, initial handling, and cleanup of HM and oil spills, as requested.

(d) Maintain the hazardous material spill response kit (AEL 2-550024007) and the oil spill response kit (AEL 2-550024006).

(e) Ensure that HM and oil spills are handled per appendices B3-A and B3-B.

(f) Inspect OHS spill kits monthly, and replenish material as required.

(g) Maintain an OTTO fuel spill kit (AEL A006350027) to respond to OTTO Fuel Spills. (OTTO fuel is propellant named after its developer, Dr. Otto Reitlinger)

b. Oil and Hazardous Substance (OHS) Spill Response Elements:

(1) The DCA shall implement a spill contingency plan (SCP) using the Navy's shipboard oil and hazardous substance (OHS) spill contingency plan guide. These plans include

information on spill response team makeup, spill cleanup equipment location, internal and external spill reporting criteria, as well as procedures that are unique to the ship.

(2) Damage control teams required to combat an emergency involving HM, and the ship's fire department (if used aboard) shall receive training on HM emergency procedures. The DCA shall ensure training is provided and supervise ship's damage control efforts to combat HM spills. Ships shall conduct and document at least one OHS spill response drill for each duty section annually as per reference B3-4.

c. OHS Spill Response Training

(1) Ships shall conduct and document at least one OHS spill for each duty section annually per reference B3-4. The ship shall train the spill response team, in-port watchstanders, command duty officers on in port OHS spill response procedures, the ship's spill contingency plan, and local notification requirements prior to assignment per reference B3-4.

SUBMARINE REQUIREMENTS:

d. Responsibilities

(1) **The Damage Control Assistant shall:**

(a) Train and supervise ship's damage control efforts to combat HM spills. Conduct HM spill response drills as necessary.

(b) Provide training to divisions regarding reporting, initial handling, and cleanup of HM spills, as requested.

(c) Maintain an OTTO fuel spill kit (AEL A006350027) to respond to OTTO fuel Spills.

(d) Hazardous material emergency response shall be conducted per guidance provided in references B3-27 and B3-28. The DCA shall follow the toxic gas bill in preparation for possible HM spills or releases to the environment. Reporting requirements for a HM spill which goes over the side are found in reference B3-4, chapter 19.

e. Oil and Hazardous Substance (OHS) Spill Response Elements:

The DCA shall implement a spill contingency plan (SCP) using the guidance provided in references B3-27 and B3-28. The DCA shall follow the toxic gas bill in preparation for possible HM spills or releases to the environment. Reporting requirements for a HM spill which goes over the side are found in reference B3-4, chapter 19.

B0305. PROGRAM EVALUATION

a. The HMC&M Program shall be evaluated annually for compliance and effectiveness. The checklists of appendices B3-C (surface ships), B3-D (submarines), and C23-B (surface) may be used for this purpose. Additional checks can be found in references B3-6 and B3-7. Where possible, industrial hygiene officer assistance shall be obtained in conducting the evaluation.

b. During HM coordinator spot checks and other inspections, all or portions of the checklists of appendices B3-C, B3-D, and C23-B may be used. The HM coordinator shall ensure the appropriate supervisor is included in inspections of work-centers and HM storage areas.

CHAPTER B3

REFERENCES

B3-1. BUMEDINST 6260.30, Mercury Control Program For Dental Treatment Facilities

B3-2. NAVSEA Manual S9510-AB-ATM-010(U), Nuclear Submarine Atmosphere Control Manual (NOTAL)

B3-3. 29 CFR – Labor, Standard Number 1910.1200, Hazardous Communication Standard

B3-4. OPNAVINST 5090.1B

B3-5. COMSUBLANT/COMSUBPACINST 4406.1E, Submarine Supply Procedures Manual

B3-6. NAVSUP Publication P-485, Naval Supply Procedures

B3-7. NSTM 670, Stowage, Handling, and Disposal of Hazardous General Use Consumables

B3-8. OPNAVINST 5100.28

B3-9. NAVSEA S593-A1-MAN-010, Shipboard Management Guide to PCBs (NOTAL)

B3-10. OPNAVINST 5102.1D/MCO P5102.1B, Navy and Marine Corps Mishap and Safety Investigation, Reporting, and Record Keeping Manual

B3-11. NAVSEA S9593-CT-MAN-010, Instruction Manual for the HM Spill Response Kit

B3-12. NAVSEA S9593-DV-HBK-010, Instruction Manual for the Oil Spill Response Kit

B3-13. OHS Spill Contingency Plan Guide – http://navyseic.dt.navy.mil/

B3-14 NSTM 079, Volume II, Practical Damage Control

B3-15. NAVAIR 00-80-R-14, US Navy Aircraft Firefighting and Rescue Manual

B3-16. Naval Warfare Publication 62-1, Surface Ship Survivability

B3-17. NSTM 555, Volume I, Surface Ship Firefighting

B3-18. OPNAV Publication P-45-114-95, CNO Policy Guide for Shipboard Hazardous Material Container Disposal

B3-19. Hazardous Inventory Control System Windows (HICSWIN) Afloat Desk Guide

B3-20. NAVSUP Publication P-722, Consolidated Hazardous Material Reutilization and Inventory Management Program (CHRIMP) Manual

B3-21. NAVSUP Publication P-573, Storage and Handling of Hazardous Materials

B3-22. Shipboard Safety Equipment Shopping Guide (NAVSAFECEN Publication)
http://safetycenter.navy.mil/osh/afloat/shoppingguide.htm

B3-23. NSTM 077, Personnel Protection Equipment

B3-24. NSTM 593, S9086-T8-STM-010/CH-593R4, Pollution Control

B3-25. NAVSEA S9593-DS-GYD-010, Preliminary Technical Manual Design and Installation Guidance for Hazardous Material Minimization Center (HAZMINCEN) Areas on Surface Ships

B3-26. NAVSEA Instruction 5100.3D, Control of Mercury, Mercury Compounds, and Components Containing Mercury or Mercury Compounds

B3-27. COMNAVSUBFOR Instruction 5400.38, "Standard Submarine Organization and Regulations Manual (SSBN)"

B3-28. COMNAVSUBFOR Instruction 5400.39, "Standard Submarine Organization and Regulations Manual (SSN)"

Appendix B3-A

Oil and Hazardous Substance (OHS) Spill Response Procedures (Surface Ships Only)

1. **Introduction**. Because of the extremely hazardous nature of many materials used aboard ships, only trained personnel shall respond to a hazardous material (HM) or oil spill. Personnel shall be trained by the damage control assistant or supervisory personnel to clean up small spills of oil and HM. Appropriate material safety data sheets (MSDSs) shall be used to conduct training.

Response procedures for many specific situations are provided in other documents. See reference B3-16 for repair party responsibilities. See references B3-17 for shipboard HM fire fighting procedures; reference B3-14, Volume 2 for HM damage control procedures; and reference B3-23, B3-7, and B3-8 for personal protective equipment guidance. See reference B3-15 for aircraft HM fire fighting procedures. For descriptive purposes, the spill response procedures have been divided into nine phases:

a. Discovery and notification.

b. Initiation of action.

c. Evaluation.

d. Containment and damage control.

e. Dispersion of gases/vapors.

f. Cleanup and decontamination.

g. Disposal of contaminated materials.

h. Certification for re-entry.

i. Follow-up reports and spill response kit replenishment.

Each response phase is **not** a separate response action entirely independent of all other phases. Several phases may occur

simultaneously and may involve common elements in their operation. For example, containment and damage control may also involve cleanup and disposal techniques.

2. **Spill Discovery and Notification**

a. Spills or potential spills of oil or HM may be discovered by regularly scheduled inspections of storerooms and workshops, by detection devices such as fire alarms and oxygen deficiency detectors, and during routine operations. All discoveries of spills or situations that may lead to a spill must be verbally reported **immediately** to supervisory personnel and the officer of the deck (OOD)/command duty officer (CDO). Crewmembers are **not** to remain in the area to investigate the spill. Whenever possible, however, the discoverer/initial response team shall report the following information:

(1) Time of spill discovery.

(2) Location of spill.

(3) Identification of spilled material.

(4) Behavior of material (reactions observed).

(5) Source of spill (e.g., tank or container).

(6) Personnel in vicinity of spill (list by name and department).

(7) Volume of spill.

(8) Anticipated movement of spill (e.g., leakage to lower deck passage from amidships toward galley, floating in water toward pier, etc.).

(9) Labeling or placarding information (copy data from spilled container only after exposure to spill is eliminated).

b. Overboard spills of reportable quantities of oil or HM shall be reported per reference B3-4.

3. **Initiation of Action**. Coordination and direction of spill response efforts at the scene of an oil or HM spill shall be accomplished by the ship's OOD, CDO, fire chief, damage control party leader, or senior person at the scene, as appropriate, who shall initiate the following actions:

a. Evacuate all personnel from areas that may be exposed to the spilled material.

b. Cordon off the affected area.

c. Arrange first aid for injured personnel.

CAUTION:

Do not enter the contaminated area until the necessary protective clothing and equipment have been determined.

d. Establish a command post and communications network.

e. Prevent spills from entering other compartments by any means that do not involve personnel exposure to the spill, such as closing drains, ventilation ducts, doors, and hatches.

f. Disperse gases or vapors to weather using blow-out (forced exhaust) ventilation or by natural ventilation such as opening doors or hatches. If atmosphere is suspected to be flammable or explosive, only explosion-proof fans shall be used for blow-out ventilation.

g. Eliminate any fire or explosion hazards such as electrical equipment, incompatible materials, and open flames.

4. **Evaluation**. Proper evaluation of a spill can prevent fires, explosions, personal injury, or permit steps to lessen their impact. This evaluation consists of the following three steps:

a. Obtain as much of the following information as possible from container labels and MSDS before starting response actions:

(1) Type and concentration of the spilled material.

(2) Hazardous characteristics of the spilled material, such as:

(a) Flash Point;

(b) Toxicity;

(c) Corrosiveness;

(d) Potentially incompatible substances;

(e) Effects resulting from exposure (fainting, dizziness, skin or eye irritation, nausea);

(f) First aid measures for exposure.

b. Determine dangerous conditions or potential consequences of the spill, including:

(1) Fire or explosion.

(2) Presence of oxygen-deficient atmosphere in compartment.

(3) Presence of toxic or explosive gases.

(4) Possibility of dangerous vapors being drawn into ship's ventilating system.

(5) Other HM in the compartment that would play a role in a fire or explosion or is incompatible with the spilled material.

c. Determine from the MSDS the appropriate spill response equipment and protective clothing necessary for safe and effective response.

5. **Containment and Damage Control**. Actions taken during this phase are directed toward controlling the immediate spread of the spill and minimizing the impact to the ship and crew. Depending on the type of spill, some or all of the following procedures may be employed:

a. Fight fire (if any), being careful to use fire fighting methods compatible with the material involved. Firefighting procedures are provided in reference B3-17.

b. Shut off or otherwise stem the spill at its source, whenever feasible, by:

(1) Replacing leaking containers.

(2) Plugging leaks in tanks.

(3) Emptying tank of remaining contents.

(4) Encapsulating a leaking container into a larger, liquid-tight container.

(5) Segregating leaking containers.

c. Predict spill movement and take further action to prevent the spill from possibly entering other compartments by closing scuppers, drains, ventilation ducts, doors, or hatches.

d. Contain liquid material using barriers, such as sand, sorbents, or other equipment suitable to dam the flow.

6. **Dispersion of Gas/Vapor**. If a flammable gas or vapor is released as a result of the spill, the gas/vapor shall be dispersed or diluted as soon as possible. The gas/vapor shall not be allowed to enter other compartments. In some cases, the explosive atmosphere shall be contained and diluted to lower its concentration below the lower explosive limit (LEL). Have the gas free engineer check the spill area for LEL and toxicity. The atmosphere can then be dispersed by one of the following methods:

a. Normal exhaust ventilation (explosion-proof only).

b. Blow-out ventilation (powerful exhaust ventilation provided in some HM storerooms--explosion-proof only).

c. Doors and hatches open to the weather.

d. Portable fans (explosion-proof only).

7. **Cleanup and Decontamination**. During this response phase, personnel, as directed by the person in charge, shall employ the spill cleanup materials from the oil spill response kit (AEL C550024006) or the HM spill response kit (AEL C550024007),

as applicable. Materials from the HM spill response kit can be used for the cleanup of mercury. Cleanup methods outlined in references B3-4 and B3-5 shall be used for the cleanup of HM and oil spills. In the case of a mercury spill, those procedures outlined in appendix B3-B shall be used. All surfaces shall be thoroughly cleaned of the spilled material. After the spill cleanup, the compartment shall be thoroughly ventilated. Reusable protective clothing shall be thoroughly decontaminated and otherwise maintained before it is returned to its proper storage location.

NOTE:

Identification of specific requirements for respiratory protection and proper use of this equipment is a critical aspect of all cleanup and decontamination operations.

8. **Disposal of Contaminated Materials**. All non-reusable cleanup materials are to be placed in impermeable containers, stored and disposed of as hazardous waste per appendix L of reference B3-2. These materials include unrecoverable protective clothing, sorbents, rags, brooms, and containers.

9. **Certification for Safe Re-Entry**. The spaces affected by the spill shall be certified safe by the OOD/CDO before normal shipboard operations are resumed in that space. The OOD/CDO shall ascertain the following before allowing re-entry:

a. All surfaces--deck, counters, bulkheads, and overheads--have been thoroughly cleaned of the spilled material.

b. All compartments have been adequately ventilated as determined from analysis by the gas free engineer.

c. All contaminated cleanup materials, including protective clothing, have been packaged, marked and handled as used HM.

10. **Follow-up Reports** and Spill Response Kit Replenishment.

a. Reporting procedures for overboard oil and HM spills are contained in reference B3-2. The OOD/CDO shall submit to the HM coordinator a spill report for all on board spills. A copy of this report shall be filed by the safety officer and shall contain the following information:

(1) Date spill occurred.

(2) Spill location.

(3) Identity of spilled material.

(4) Cause(s) of spill.

(5) Damage or injuries resulting from the spill.

(6) Response and cleanup measures taken.

(7) Any problems encountered.

(8) Method of disposing of contaminated material.

(9) Action taken to prevent the repeat of a similar spill.

b. All depleted spill response kit components shall be replenished with new stock and the kit returned to its designated storage location.

Appendix B3-B

Mercury Spill Response and Cleanup Procedures (Surface Ships Only)

1. **Mercury Spill Cleanup Procedures.** Procedures shall vary according to the size and complexity of the mercury spill. Refer to B3-4 and B3-26.

a. **Broken Fluorescent Bulbs**

(1) Set up local exhaust ventilation.

(2) Carefully sweep up bulb debris and double bag for disposal as HM.

(3) Clean the area with a solution of HgX® mercury decontaminant from the HM Spill Response kit.

b. **Small Spills**: Clean mercury spills with 50 grams (3/4 teaspoon or quarter size) or less immediately as follows:

(1) If spill is in a confined area, set up local exhaust ventilation. If ventilation cannot be provided, a suitable respirator should be worn.

(2) Spill cleanup personnel shall not eat, drink, smoke or apply cosmetics in spill area. They shall wash thoroughly with soap and water after cleanup.

(3) Apply absorbent material from the HM spill response kit to spilled mercury and dispose as HM.

(4) Wipe down spill area with HgX® solution from the spill kit.

(5) Discard any contaminated materials and protective clothing and dispose as HM.

c. **Large Spills**: Clean mercury spills of more than 50 grams (3/4 teaspoon or quarter size) immediately as follows:

(1) Stop work operations in the area.

(2) Warn personnel of the spill and its location, evacuate the area, and establish safe boundaries.

(3) Call the oil and hazardous substance (OHS) spill team. Describe the nature and location of the spill.

(4) Use a mercury vapor meter to determine mercury vapor and degree of hazard, if possible.

(5) Apply absorbent material from the HM Spill Response kit to spilled mercury and dispose as HM.

(6) Wipe down spill area with HgX® solution from the spill kit.

(7) Discard any contaminated materials and protective clothing and dispose as HM.

(8) Use a mercury vapor meter to detect any residual mercury. Reclean with HgX® if mercury vapor concentration exceeds 0.05 milligram per cubic meter (mg/m3).

(9) Use the mercury vapor meter after 24 hours to determine mercury vapor concentration. An allowable concentration of less than <0.01 milligram per cubic meter (mg/m3) must be attained in any space to be continually occupied by an individual for eight or more hours daily.

2. **Mercury Waste Disposal.** Mercury is an environmental pollutant and must not be discharged into any body of water or released into any ship's waste disposal system. Disposal should be coordinated with the HM coordinator and shore facility. All non-reusable cleanup materials are to be placed in impermeable containers, stored and disposed of per appendix L of reference B3-2. These materials include unrecoverable protective clothing, sorbents, rags, brooms, and containers.

Appendix B3-C

HAZARDOUS MATERIAL CONTROL AND MANAGEMENT (HMC&M) CHECKLIST SURFACE SHIP PROGRAM

	PROGRAM RESPONSIBILITIES	Yes	No
1.	Has the **commanding officer** assigned the responsibility for implementation of the consolidated hazardous material reutilization inventory management program (CHRIMP) afloat through the operation of a hazardous material minimization center (HAZMINCEN) to the shipboard supply department? B0302a (1)		
2.	Has the **commanding officer** appointed/assigned, in writing, a commissioned officer within the supply department (or a chief or leading petty officer) to be the HM coordinator in accordance with B0302a (1)?		
3.	Has the **commanding officer** appointed/assigned, in writing, a HM supervisor/lead petty officer that is a graduate of the HMC&M Technician (SNEC 9595) Course to operate the HAZMINCEN? B0302a (1)		
4.	Has the **commanding officer** prepared and submitted an annual report of HAZMINCEN operational efficiency to the chain of command? B0302a (1)		
5.	Has the **commanding officer** approved, by signature, ship's hazardous material list (SHML) feedback reports (SFRs)? If elected, has the **commanding officer** designated an O-5 or above, in writing, to approve SFRs? B0302a (1)		
6.	Has the **commanding officer** ensured compliance with OPNAV transfer and disposal policy guidance provided in reference B3-4, chapter 19, appendix L? Has the CO reported to the fleet commanders by message, information to the chain of command, any conditions or system/equipment malfunctions that results in an overboard discharge of HM within restricted waters per reference B3-4 and applicable operations orders (OPORDs)? B0302a (1)		

		Yes	No
7.	Has the **executive officer** semi-annually reviewed the list of HM to ensure that CHRIMP efforts are optimized to minimize HM stowage locations and eliminate excessive or unauthorized quantities of HM? B0302a (2)		
8.	Has the **executive officer** assigned sufficient personnel to the HAZMINCEN to accomplish CHRIMP and ensured an individual with SNEC 9595 qualification is operating the HAZMINCEN? B0302a (2)		
9.	Has the **executive officer** approved work-center HM storage locations/lockers in writing, as applicable, to support daily evolutions? B0302a (2)		
10.	Has the **executive officer** reviewed the HAZMINCEN delinquent containers report generated from the HM software inventory management program (hazardous inventory control system windows (HICSWIN)) and ensured that action was taken to correct outstanding/repeated delinquencies? B0302a (2)		
11.	Has the **executive officer** ensured that supply and safety officers are making monthly satellite locker inspections and quarterly storeroom inspections and are taking action to correct deficiencies? B0302a (2)		
12.	Has the **executive officer** ensured that HM needed for embarked units (Marines, airwing squadrons, special forces, etc.) is authorized for use on board ship and that there is an agreement, in writing, detailing responsibilities of ships company and the embarked unit? B0302a (2)		
13.	Has the **executive officer** ensured that HM brought on board by contractor and shipyard representatives is controlled and offloaded in accordance with contract requirements? B0302a (2)		
14.	Has the **executive officer** reviewed the ship's training plan annually to ensure that HM awareness training is included? B0302a (2)		

		Yes	No
15.	Has the **executive officer** ensured that all supervisors (department heads, division officers and petty officers) receive the HM awareness training annually? Has the **executive officer** ensured that supervisors provide HM awareness training to all hands? B0302a (2)		
16.	Have **department heads** assisted the executive officer in a semi-annual review of the list of HM to ensure that CHRIMP efforts are optimized to minimize HM stowage locations and eliminate excessive or unauthorized quantities of HM? B0302a (3)		
17.	Have **department heads** ensured that HM retained within their work-centers is required for the operations and maintenance of assigned equipments and does not exceed the quantity needed to satisfy operational needs/requirements? B0302a (3)		
18.	Have **department heads** ensured that department personnel are available to receive annual HM awareness training? B0302a (3)		
19.	Have **department heads** ensured that used or excess HM is properly turned into the HAZMINCEN for turn over to the shore activity offload personnel? B0302a (3)		
20.	Has the **supply officer/HM coordinator/HM supervisor** operated the HAZMINCEN in accordance with guidance in chapter B3 and in chapter C23? B0302a (4)		
21.	Has the **supply officer/HM coordinator/HM supervisor** prepared and submitted a weekly HAZMINCEN operation summary report to the chain of command IAW B0302a (4)? B0302a (4)		
22.	Has the **supply officer/HM coordinator/HM supervisor** prepared and submitted a quarterly report of HAZMINCEN operational efficiency to the CO? B0302a (4)		
23.	Is the **HM coordinator** a graduate of the Afloat HM Coordinator course or equivalent Supply Corps Officer training? Is the **HM supervisor**/lead petty officer a graduate of the HMC&M Technician (SNEC 9595) Course? B0302a (4)		

		Yes	No
24.	Has the **supply officer/HM coordinator/HM supervisor** provided quarterly training to HAZMINCEN personnel on proper handling, issuing, labeling, stowage, receipt processing, inventories, spill response and disposal procedures? B0302a (4)		
25.	Has the **supply officer/HM coordinator/HM supervisor** provided quarterly HM training is to division/work-center personnel responsible for maintaining in-space storage lockers? Does training include inventorying, marking, stowage and the use of MSDS? B0302a (4)		
26.	Has the **supply officer/HM coordinator/HM supervisor** ensured a MSDS is on file (either hard copy or on CD-ROM) for all types and brands of HM taken aboard? B0302a (4)		
27.	Has the **supply officer/HM coordinator/HM supervisor** ensured that only HM authorized for shipboard use by the Ship's hazardous material list (SHML) is requisitioned, or if necessary to do so, that a SHML feedback report (SFR) is promptly submitted? Have the SHML feedback reports (SFRs) been signed by the commanding officer (or a designated O-5 or above) and transmitted to NAVCIP for processing? B0302a (4)		
28.	Has the **supply officer/HM coordinator/HM supervisor** contacted the stock control officer to ensure all HM orders are approved by the HAZMINCEN prior to ordering or signing all purchase requests for HM items? B0302a (4)		
29.	Has the **supply officer/HM coordinator/HM supervisor** identified, in writing, locations and quantities of all HM/excess HM stored aboard ship? Has the list been provided to the executive officer, department heads, gas free engineer, damage control assistant (DCA), fire marshal, safety officer and senior medical officer? B0302a (4)		

		Yes	No
30.	Has the **supply officer/HM coordinator/HM supervisor** executed the following inspections, and taken corrective action for all deficiencies found? Have the inspection been in accordance with chapters B3, C23 and reference B3-6, section 8202, hazardous material division check off list? Have the inspections been conducted in coordination with the safety officer? B0302a (4) (1) Monthly satellite locker inspections; (2) Monthly spot-check of HM practices of division personnel; (3) Quarterly storeroom inspections; (4) Annual ship-wide physical inventory of all HM.		
31.	Has the **supply officer/HM coordinator/HM supervisor** approved work-center HM storage locations/lockers in writing, as applicable, to support daily evolutions? Was the approval of locker locations coordinated with the safety officer, DCA, and XO? B0302a (4)		
32.	Has the **supply officer/HM coordinator/HM supervisor** acted as the ship's single point of contact in the offload of used/excess HM? Has used HM been received and segregated/consolidated and labeled/marked in accordance with chapter C23? Has the **supply officer/HM coordinator/HM supervisor** supervised document preparation for offload of used / excess HM and prior to getting underway, ensured that no HM remains on the pier? Has the **supply officer/HM coordinator/HM supervisor** ensured that all contractor and shipyard representatives offload all HM brought on board following completion of their work? B0302a (4)		
33.	Has the **supply officer/HM coordinator/HM supervisor** ensured that personnel assigned to the HAZMINCEN are trained on duties and responsibilities prior to assuming these duties? Has the **supply officer/HM coordinator/HM supervisor** ensured at least the number of persons specified in the ships manning document are assigned to operation the HAZMINCEN? B0302a (4)		
34.	Has the **supply officer/HM coordinator/HM supervisor** maintained HICSWIN? B0302a (4)		

		Yes	No
35.	Has the **supply officer/HM coordinator/HM supervisor** managed embarked unit (Marines, Airwing Squadrons, Special Forces, etc.) HM in accordance with B0302? (i.e. ensure embarked units do not bring onboard prohibited HM; Screen embarked unit HM against the ships T-SHML; ensure embarked units provide a valid requirement for material needed onboard ship (i.e., maintenance procedure, technical manual, etc.); ensure embarked units submit requirements for hazardous material to the ship prior to embarking; Ensure that the embarked unit only brings unique hazardous material onboard that is authorized by the ship. In this case, ensure the embarked unit takes responsibility for the offload of the material (upon departure of the embarked unit or aircraft)) B0302a (4)		
36.	Has the **supply officer/HM coordinator/HM supervisor** ensured that the HAZMINCEN is equipped with an Oil and Hazardous Substance (OHS) spill kit? Has the **supply officer/HM coordinator/HM supervisor** ensured that the DCA is aware of his responsibility to maintain and replenish spill kit material? B0302a (4)		
37.	Has the **supply officer/HM coordinator/HM supervisor** ensured that the HAZMINCEN pollution prevention afloat (P2A) equipment is operational, and being used safely in accordance with instructions? B0302a (4)		
38.	Have the **division officers** ensured that only NAVSEA-approved, in-space storage lockers are used and that locations/installations are approved by the HM coordinator, safety officer, DCA and XO? Have the **division officers** ensured lockers are installed and labeled in accordance with reference B3-7? B0302a (5)		

		Yes	No
39.	Have the **division officers** ensured that HM retained within their work-centers is specific to the operations and maintenance of assigned equipment and that no more than a seven-day supply of HM is retained in work-center spaces? Have the **division officers** ensured that longer storage to address special needs is authorized, in writing, by the HM coordinator, DCA, safety officer, and XO? B0302a (5)		
40.	Have the **division officers** ensured that HM training is provided quarterly to division personnel responsible for maintaining in-space storage lockers? B0302a (5)		
41.	Have the **division officers** ensured that used or excess HM is properly returned to the HAZMINCEN? B0302a (5)		
42.	Have the **division officers** ensured that approved personal protective clothing and equipment are available for HM operations or incidents and personnel are trained in their proper use and maintenance as described in reference B3-8 and on applicable PMS cards and MSDSs? Have the **division officers** ensured that upon reporting on board and annually thereafter; all personnel are educated on HMC&M (ordering, issuing, reutilization, handling, storing, using, disposal, and spill response? B0302a (5)		
43.	Are **division personnel** available to receive annual HM awareness training? Have the **division officers** incorporated HM training into normally scheduled weekly divisional training? B0302a (5)		
44.	Have the **division officers** ensured that any PCB-containing electrical or electronic components are labeled/marked per reference B3-9 and associated NAVSEASYSCOM-issued PCB advisories? B0302a (5)		
45.	Has the **safety officer** approved work-center HM storage locations/lockers, in coordination with the HAZMINCEN Division? B0302a (6)		

		Yes	No
46.	Has the **safety officer** conducted monthly spot checks, in conjunction with the master-at-arms force and the HAZMINCEN division, to ensure day-to-day compliance with CHRIMP requirements? Have the spot checks included checking for improper stowage and use of HM in the HAZMINCEN and work-center lockers? Are spot checks conducted such that all divisions are checked at least twice per year? B0302a (6)		
47.	Has the **safety officer** executed the following inspections with the HAZMINCEN division: (1) Monthly satellite locker inspections; (2) Quarterly storeroom inspections? B0302a (6)		
48.	Has the **safety officer** evaluated the CHRIMP/HAZMINCEN program annually for compliance and effectiveness? B0302a (6)		
49.	Has the **safety officer** reported all HM mishaps as required by reference B3-10? B0302a (6)		
50.	Has the **afloat environmental protection coordinator (AEPC)** performed the functions described in reference B3-4 and ensured that HAZMINCEN pollution prevention afloat (P2A) equipment is operational and in use? B0302a (7)		
51.	Has the **damage control assistant (DCA**) coordinated HM spill response drills with the HAZMINCEN division as necessary? B0302a (8)		
52.	Has the **damage control assistant (DCA)** approved work-center HM storage locations/lockers in writing, as applicable, to support daily evolutions in coordination with the HAZMINCEN division? B0302a (8)		
53.	Has the **medical department representative (MDR)** assisted the HM coordinator/HM supervisor and work-center supervisors in training personnel regarding health information and personal protective equipment requirements for the HM they are using? B0302a (9)		
54.	Has the **medical department representative (MDR)** maintained a complete MSDS file? B0302a (9)		

		Yes	No
55.	Have the **division supply petty officers/repair parts petty officers** requested HM from the HAZMINCEN and ensured before HM is ordered that a valid requirement exists? Have the **division supply petty officers/repair parts petty officers** used HM listed on the SHML to avoid open procurement of HM, and submitted an SFR to HAZMINCEN personnel whenever requesting HM not authorized by the SHML? B0302a (10)		
56.	Have the **embarked unit supply petty officers/repair parts petty officers** executed, in writing, an agreement detailing responsibilities of ships company and the embarked unit, including procurement, storage, reorder and offload of HM? B0302a (11)		
57.	Have the **embarked unit supply petty officers/repair parts petty officers** submitted requirements for hazardous material to the ship prior to embarking and provided a valid requirement for material needed on board ship (i.e., maintenance procedure, technical manual, etc.)? Have the **embarked unit supply petty officers/repair parts petty officers** ensured that the HM is screened against the ships T-SHML to ensure it is authorized for use on board ship? Have the **embarked unit supply petty officers/repair parts petty officers** given sufficient notice to allow the ship to order and receive the hazardous material? B0302a (11)		
58.	Have the **embarked unit supply petty officers/repair parts petty officers** offloaded any HM (not supplied by the ship) brought on board in accordance with applicable requirements? B0302a (11)		
59.	Have **work-center supervisors** ensured that required personal protective clothing and equipment are maintained and used? B0302a (12)		

		Yes	No
60.	Have **work-center supervisors** ensured that prior to initial use or handling any HM, work-center personnel have been trained on the hazards associated with that material and are familiar with what an MSDS is, what it contains, and where a copy is available for review? Have **work-center supervisors** trained work-center personnel in the use of MSDS? B0302a (12)		
61.	Have **work-center supervisors** ensured that a valid maintenance requirement exists for any HM item not listed in the SHML and initiated a SFR? B0302a (12)		
62.	Have **work-center supervisors** removed unauthorized HM from the work-center? B0302a (12)		
63.	Have **work-center supervisors** ensured a copy of the hazardous material user's guide (HMUG) is available for use by work-center personnel? B0302a (12)		
64.	Have **work-center supervisors** ensured that work-center HM lockers are secured, labeled and have contents identified and approved by the XO, safety officer, DCA, and HAZMINCEN division? B0302a (12)		
65.	Have **all hands** stowed or returned HM to approved locker or the HAZMINCEN upon completion of use or no later than the end of the workday?		
66.	Have **all hands** used and handled HM in accordance with the applicable MSDS and reference B3-8?		
67.	Have **all hands** collected and segregated any residue resulting from use of HM issued from the HAZMINCEN for turn-in to the supply department/HAZMINCEN?		
68.	Have **all hands** reported any spills of HM to the officer of the deck, and/or damage control central/central control station?		
69.	Have **all hands** completed annual HM awareness training?		

	OIL AND HAZARDOUS SUBSTANCE (OHS) SPILL RESPONSE	Yes	No
70.	Has the **damage control assistant (DCA)** developed and implemented a spill contingency plan (SCP), using the Navy's shipboard oil and hazardous substance (OHS) spill contingency plan guide per reference B3-4 and B3-13? B0304a (1)		

		Yes	No
71.	Has the **damage control assistant (DCA)** trained and supervised ship's damage control teams (and fire department, if used aboard) in combating spills of HM and oil? B0304a (1)		
72.	Has the **damage control assistant (DCA)** provided training to divisions regarding reporting, initial handling, and cleanup of HM and oil spills, as requested? B0304a (1)		
73.	Has the **damage control assistant (DCA)** maintained the hazardous material spill response kit (AEL 2-550024007) and the oil spill response kit (AEL 2-550024006)? B0304a (1)		
74.	Has the **damage control assistant (DCA)** ensured that HM and oil spills are handled per appendices B3-A and B3-B? B0304a (1)		
75.	Has the **damage control assistant (DCA)** inspected OHS spill kits monthly and replenished material as required? B0304a (1)		
76.	Has the **damage control assistant (DCA)** maintained the OTTO fuel spill kit (AEL A006350027) to respond to OTTO fuel Spills? B0304a (1)		

Appendix B3-D

HAZARDOUS MATERIAL CONTROL AND MANAGEMENT (HMC&M) CHECKLIST SUBMARINE PROGRAM

	PROGRAM RESPONSIBILITIES	Yes	No
77.	Has the **commanding officer** reported all HM mishaps as required by OPNAVINST 5102/MCO P5102.1B? B303a (1)		
78.	Has the **commanding officer** reported to the fleet commanders by message, information to the chain of command, any conditions or system/equipment malfunctions that results in an overboard discharge of HM into or upon the marine environment per reference B3-4 and applicable operations orders (OPORDs)? B303a (1)		
79.	Has the **commanding officer** ensured that spills of HM are handled per the submarine SORM? B303a (1)		
80.	Has the **executive officer** granted written permission to carry on board any restricted HM during an underway period (refer to chapter D15 and reference B3-2 for definitions of submarine material control usage categories)? B303a(2)		
81.	Has the **executive officer** ensured assigned personnel follow the conditions under which restricted or limited HM are stored or used on board to minimize the release (off-gassing, mists, or vapors) of potential atmospheric contaminants into the submarine? B303a(2)		
82.	Has the **executive officer** reviewed the submarine material control log prior to each underway operation of 24 hours or greater, conducted in the recirculation mode, to ensure that restricted (R) items have been removed from the submarine? B303a(2)		
83.	Have the **department heads** ensured that HM retained within their work-centers is unique to the operations and maintenance of assigned equipment and does not exceed the quantity needed to satisfy operational requirements? B303a (3)		
84.	Have the **department heads** ensured used or excess HM is properly returned to the supply officer for turnover to the shore activity? B303a(3)		

		Yes	No
85.	Have the **department heads** reported all items found with a restricted (R) or limited (L) use code that have not been logged in the submarine material control log to the supply officer for logging, labeling, and assignment of approved storage location, or disposal? B303a(3)		
86.	Have the **department heads** reported all items found that are not listed (categorized) in the submarine material control list (SMCL) to the supply officer? Items not listed in the SMCL are prohibited per paragraph D1502(a). B303a(3)		
87.	Have the **department heads** obtained written permission from the executive officer to retain on board restricted items during underway operations? B303a(3)		
88.	Have the **department heads** ensured that restricted items authorized for in-port-use-only are removed from the submarine as soon as the need for them no longer exists? Have the **department heads i**nformed the supply officer of their removal to allow documentation in the submarine material control log? B303a(3)		
89.	Have the **department heads** ensured that all HM in their custody are used, handled, and stowed per the requirements of chapter D15? B303a(3)		
90.	Has the **supply officer/HM coordinator** ensured that management of shipboard HM follows procedures outlined in chapter B3 and chapter D15? B303a(4)		
91.	Has the **supply officer/HM coordinator** ensured an MSDS is on file (either hard copy or on CD-ROM) for all types and brands of HM taken aboard? Has the **supply officer/HM coordinator** ensured that hard-copy MSDSs are readily accessible to personnel and their supervisors, and maintained the submarine hazardous material inventory and management system (SHIMS) which contains MSDS information? Has the **supply officer/HM coordinator** submitted hard copies of MSDSs which are not on the SHIMS system to Naval Surface Warfare Center, Carderock Division, code 634? B303a(4)		
92.	Has the **supply officer/HM coordinator** ensured no prohibited HM is brought on board? B303a(4)		

		Yes	No
93.	Has the **supply officer/HM coordinator** maintained the submarine material control log per paragraph D1502d? B303a(4)		
94.	Has the **supply officer/HM coordinator** ensured all HM brought on board is authorized for storage and use onboard by the submarine material control list (SMCL)? Has the **supply officer/HM coordinator** affixed an atmosphere contaminant tag (appendix D15-C) for any material that is a shipboard restricted (R) or limited (L) use code HM? B303a(4)		
95.	Has the **supply officer/HM coordinator** initiated an investigation of any item suspected of being an atmosphere contaminant per the procedures of reference B3-2 and submitted a SMCL feedback report per chapter D15? B303a(4)		
96.	Has the **supply officer/HM coordinator** ensured that all restricted (R) and limited (L) items are inventoried every six months or prior to a change of command? B303a(4)		
97.	Has the **supply officer/HM coordinator** reviewed the submarine material control log weekly in port and monthly underway? B303a(4)		
98.	Has the **supply officer/HM coordinator** obtained commanding officer's written authorization prior to open purchasing any HM? B303a(4)		
99.	Has the **medical department representative (MDR)** assisted work-center supervisors in training personnel regarding health information and personal protective equipment requirements for the HM they are using? B303a(5)		
100.	Has the **MDR** provided medical assistance in the event of a HM spill or mishap involving HM and used MSDS information in SHIMS provided by the supply officer? B303a(5)		
101.	Have the **division officers** ensured that when HM is transferred into other containers the new containers are properly marked with the information specified in paragraph D1502d? B303a(6)		

		Yes	No
102.	Have the **division officers** ensured approved personal protective clothing and equipment are available for HM operations or incidents and personnel are trained in their proper use and maintenance? B303a(6)		
103.	Have the **division officers** ensured personnel are made available to receive required HM training as detailed in section B0303c? B303a(6)		
104.	Have the **division officers** marked any PCB-containing electrical or electronic components per chapter D15? B303a(6)		
105.	Has the **damage control assistant** coordinated HM spill response drills with the HAZMINCEN division as necessary? B303a(7)		
106.	Has the **repair parts petty officer** ensured that before HM is ordered, a valid requirement (specifically required by a maintenance procedure or other shipboard operation) exists? Do **repair parts petty officers** use standard stock HM whenever possible to avoid procurement of open purchased HM? B303a(8)		
107.	Have the **work-center supervisors** ensured that approved personal protective clothing and equipment are maintained and utilized? B303a(9)		
108.	Have the **work-center supervisors** ensured that prior to using or handling any HM, work-center personnel have been trained on the hazards associated with that material and are familiar with what an MSDS is, what it contains, and where a copy is available for review? B303a(9)		
109.	Have the **work-center supervisors** ensured that a valid maintenance requirement exists for any HM item not listed in the SMCL and initiated a SMCL feedback report? B303a(9)		
110.	Have **all hands** ensured that HM is returned to appropriate stowage upon completion of use or at the end of the workday, whichever is earlier? B303a(10)		
111.	Have **all hands** followed instructions provided for the proper use of HM? B303a(10)		
112.	Have **all hands** collected and segregated any used HM for proper offload per chapter D15? B303a(10)		

		Yes	No
113.	Have **all hands** reported any spills of HM to the duty officer (in port) or the chief of the watch (underway)? B303a(10)		
114.	Have **all hands** reported any violation of HM use, storage, and handling precautions to the supervisor for resolution/correction? B303a(10)		
115.	Have **all hands** been alerted to prevent the on board storage and use of restricted material during underway operations without prior approval/authorization from the executive officer? Are **all hands** using limited material per SMCL guidance? B303a(10)		

	OIL AND HAZARDOUS SUBSTANCE (OHS) SPILL RESPONSE	Yes	No
116.	Has the **damage control assistant (DCA)** provided training and supervision of the command's damage control efforts to combat HM and oil spills? Has the **damage control assistant (DCA)** conducted HM spill response training? B0304d (1)		
117.	Has the **damage control assistant (DCA)** provided training to divisions regarding reporting, initial handling, and cleanup of HM spills, as requested? B0304d (1)		
118.	Has the **damage control assistant (DCA)** maintained an OTTO FUEL spill kit (AEL A006350027) to respond to OTTO Fuel Spills? B0304d (1)		
119.	Has the **damage control assistant (DCA)** conducted hazardous material emergency response per the submarine SORM? Has the reporting requirements for a HM spill which goes over the side been followed?(reference B3-4) B0304d (1)		

CHAPTER B4

HEARING CONSERVATION

B0401. DISCUSSION

The goal of the hearing conservation program (HCP) is to prevent occupational hearing loss and assure auditory fitness for duty of all Navy personnel.

Noise-induced hearing loss is the fleet's number one occupational health hazard. High intensity noise exposure results from a wide variety of shipboard operations, including gun or missile fire, aircraft noise, and ship's propulsion systems. Operational risk assessment has shown that fleet costs in terms of man hours, personal hearing protector purchases, and noise abatement operations are readily offset by the preservation of effective communication, maintained quality of life, and reduction in disability expense which accompany an effective HCP process. As such, it is incumbent upon leadership to set the right example in their personal protective practices, to enforce compliance, and to ensure HCP receives their full support.

B0402. HEARING CONSERVATION RESPONSIBILITIES

a. The commanding officer shall ensure that HCP is established and maintained within the command.

b. The safety officer shall:

(1) Request assistance from an industrial hygienist or occupational audiologist to conduct noise measurement and exposure analysis (survey) of areas and equipment. These measurements shall be taken by an industrial hygienist, occupational audiologist or by other individuals trained by an industrial hygienist or occupational audiologist.

(2) Maintain a record of noise hazardous areas and equipment. The baseline or subsequent industrial hygiene surveys, where available, shall serve as documentation. Ensure that noise hazardous spaces/equipment are posted and labeled accordingly.

(3) Ensure that all permanent threshold shifts that meet the criteria of paragraph B0409 are reported by medical departments in accordance with reference B4-1. These reports shall be periodically reviewed to determine any trends that could indicate inadequate use of hearing protection or uncontrolled overexposure to excessive noise levels.

c. Industrial hygiene officers shall:

(1) Maintain and ensure proper calibration of sound level measuring equipment.

(2) Annually, certify audiometric testing booths installed aboard the ships.

d. Division officers shall:

(1) Ensure personnel exposed to hazardous noise have and properly use hearing protection devices.

(2) Ensure that a space or piece of equipment that is designated as noise hazardous is properly posted and labeled.

(3) Ensure all personnel required to wear personal hearing protection are trained in the use and maintenance of that protective equipment, regardless of whether they require enrollment in HCP.

(4) Ensure personnel report for scheduled audiometric testing and training.

(5) Ensure that personnel who require hearing retests due to a significant threshold shift (STS) are excluded from hazardous noise areas, defined as areas exceeding 84 dB(A) (A-weighted sound pressure level (SPL) measured in decibels) for continuous or 140 dBSPL peak, for at least 14 hours before the scheduled test. Hearing protection may not be used to meet this requirement.

NOTE:

Noise exclusion should not be imposed for individuals scheduled for annual hearing testing.

(6) Coordinate with the medical department representative to identify personnel routinely exposed to hazardous levels of occupational noise.

e. The Medical Department Representative (MDR) shall:

(1) Coordinate with division officers to identify and maintain a current roster of personnel routinely exposed to hazardous levels of occupational noise, as guided by the baseline or other industrial hygiene surveys. In the absence of an appropriate industrial hygiene survey, or when it is clear that personnel have some level of exposure to hazardous noise, but on an infrequent or short-term basis, consult an industrial hygienist, occupational audiologist, or occupational medicine physician to determine the need for enrollment. The consultation may be informal (for example, by e-mail) as long as a printed record of the request and reply are available for retention by both parties. Convenience shall not be a criterion to determine inclusion in HCP.

(2) Conduct training for all hands during indoctrination that includes the elements of the hearing conservation program. Elements and rationale for the HCP to include: proper wearing and maintenance of hearing protection devices; command program and individual responsibilities; individual's responsibility in protecting their own hearing, and how hearing loss affects career progression, job performance and mission.

(3) Ensure annual refresher training, per B0408b for the HCP-enrolled personnel is performed. Reference B4-2 identifies suitable training materials and provides additional guidance.

(4) Consult the command industrial hygiene survey, or an occupational health professional to determine the type of required hearing protective devices required for personnel. Maintain an adequate stock of various sizes, of non-disposable hearing protective devices to properly fit wearers.

(5) Schedule personnel in HCP for annual audiometric testing. Ensure that all test results have been entered into each individual's health record, uploaded to the defense occupational and environmental readiness system – hearing

conservation (DOEHRS-HC) data repository, and that all appropriate and necessary follow-up actions are completed.

(6) Ensure that personnel who require hearing retests due to a significant threshold shift (STS) are excluded from hazardous noise areas, defined as areas exceeding 84 dB(A) for continuous or 140 dBSPL peak, for at least 14 hours before the scheduled test. Hearing protection may not be used to meet this requirement.

(7) If audiometric testing is performed within the MDR's command, ensure the certification of annual electro-acoustic calibration of audiometers and audiometric test chambers. Technicians conducting testing will hold current DoD occupational hearing conservation certification (CAOHC) through completion of an approved DoD or Navy sponsored course.

(8) Report, to the safety officer, all permanent threshold shifts toward deteriorated hearing, which have been determined to be consistent with occupational origin, to the safety officer. Report must include name, rate or rank, work-center and time onboard.

(9) Enter into the web-enabled safety system (WESS), per reference B4-1, work-related significant threshold shift (STS). This is defined as hearing changes from baseline that average 10 dB or more at 2000, 3000, and 4000 Hertz (Hz) in one or both ears. In addition, OSHA reportable criterion is met when a change in the person's total hearing level reaches 25 dB or greater above audiometric zero in the same ears and frequencies. If an audiologist, otologist, or occupational medicine physician determines that changes are not work related; their names may not be entered or should be removed from WESS.

f. All hands shall:

(1) Comply with hazardous noise warning labels wherever they appear, either in spaces or on equipment, and properly wear assigned hearing protective devices.

(2) Undergo hearing testing when designated.

B0403. HEARING CONSERVATION PROGRAM ELEMENTS

Hearing conservation program includes the following elements:

a. Noise measurement and exposure analysis to identify hazardous noise areas or sources and the personnel exposed

b. Application of engineering controls to reduce hazardous noise to the maximum extent feasible.

c. Use of hearing protective devices as an interim measure where engineering controls are not feasible (paragraph B0406).

d. Periodic hearing testing of all personnel at risk to monitor the effectiveness of the process, and timely audiologic and medical evaluation of those personnel who demonstrate significant hearing loss or threshold shift (paragraph B0407). Results of all testing shall be captured electronically and transmitted to the central data repository as prescribed in reference B4-2.

e. Training regarding potentially hazardous noise areas and sources, use and care of hearing protective devices, the effects of hazardous noise levels on hearing, and the command's HCP process (paragraph B0408).

B0404. NOISE MEASUREMENT AND EXPOSURE ASSESSMENT

To effectively control noise, it is necessary that the noise be accurately measured according to standard procedures and that the measurements are properly evaluated against accepted criteria.

NOTE:

For new construction ships, an airborne noise survey conducted by the shipbuilder for contract performance is not an acceptable substitute for the required noise survey and personal noise exposure assessment once the ship is loaded out with personnel and gear.

a. Noise Measurements. Noise measurements shall be taken as part of the industrial hygiene survey described in

chapter A3 of this instruction. A noise survey is required if one has not been performed, if the ship has completed a repair availability with significant work done on engineering systems, or if new equipment has been installed. These measurements shall be taken by an industrial hygienist, occupational audiologist or by other personnel trained by an industrial hygienist or occupational audiologist and shall consult with the cognizant industrial hygienist. Detailed information on noise measurements may be found in appendix B4-A. The safety officer shall retain a copy of noise measurement data per B0409.

b. Exposure Assessment

(1) The analysis of noise measurements to assess the hazard potential is a complex task that shall be performed by an industrial hygienist or occupational audiologist. The exposure assessment shall be accomplished per reference B4-3.

(2) The criteria outlined in appendices B4-A and B4-B shall also be used to determine the degree of compliance with applicable standards.

(3) In the absence of an industrial hygienist's or occupational audiologist's assessment to the contrary, personnel who routinely work in noise hazardous areas or with equipment that produces hazardous noise as defined in appendix B4-A, shall be included in HCP. Implementation of all available measures may not be necessary in every case. For example, visitors to a noise hazardous area shall be required to wear hearing protective equipment, but would not be required to have their hearing tested or be included on a roster of noise exposed personnel. See appendix B4-A for additional information.

(4) Information regarding removal of personnel from HCP is provided in appendix B4-A.

c. Labeling of Hazardous Noise Areas and Equipment

(1) Designated hazardous noise areas and equipment that produce hazardous sound levels (see appendix B4-A) shall be appropriately labeled. NAVMED 6260/2, hazardous noise warning decal (8" x 10") NSN 0105-LF-004-7200 and the NAVMED 6260/2A, hazardous noise labels (2" x 2") NSN 0105-LF-004-7800, or their

equivalents, are approved for marking hazardous noise areas and equipment.

(a) NAVMED 6260/2A or equivalent shall be used to label smaller, individual pieces of equipment or tools that produce hazardous noise.

(b) Noise hazard warning signs and labels shall be annotated as to the circumstances or operations that create the noise hazardous condition when hearing protection is required (e.g., when generator is operating).

(2) Normally the outside of doors/hatches leading into a noise hazardous area shall be posted. However, topside and weather surfaces of a ship shall not be posted. In the event that a particular area is a noise hazardous area and has an entrance from a weather deck, the inside of the weather deck door/hatch shall be posted.

(3) Exteriors of military combatant equipment are excluded from this labeling requirement. However, personnel operating and maintaining combat equipment must be made fully aware of hazardous noise exposure conditions.

B0405. NOISE ABATEMENT

a. Reduction of noise at the source is in the best interests of the Navy and its personnel. Areas and equipment that contain or produce potentially hazardous noise should be modified to reduce noise levels to within acceptable limits wherever it is technologically and operationally feasible.

b. Noise abatement actions will normally be accomplished during ship or equipment design, construction or testing. Hazardous noise areas/equipment not identified during construction or post overhaul noise surveys are most likely due to malfunctioning equipment. Noise abatement actions recommended by the industrial hygienist or resulting from Board of Inspection and Survey (INSURV) inspections shall be documented as required in chapter A4 of this instruction, and implemented as soon as possible.

c. Additional information on noise abatement is available in appendix B4-C.

B0406. PERSONAL HEARING PROTECTIVE DEVICES

a. Personnel working in or entering designated hazardous noise areas or utilizing noise hazardous tools or equipment shall have hearing protective devices available at all times, and wear them without consideration of the duration of the exposure. Exceptions to this requirement must be documented by a qualified professional.

b. A combination of insert type and circumaural (muff) type hearing protective devices (double-protection) shall be worn:

(1) In all areas where sound levels exceed 104 dB(A), unless an occupational audiologist, industrial hygienist, or occupational medicine physician has determined that single protection is adequate for the anticipated duration of the exposure.

(2) When a medical officer or audiologist determines that double-protection is required.

c. All personnel exposed to gunfire in a training situation or to noise from large caliber gun or missile firing, under any circumstances, shall wear sufficient hearing protective devices (single protection up to and between 140 dBSPL peak and double protection at 165 dBSPL peak and above) to reduce the individual's effective exposure level to below 84 dB(A)/140 dBSPL, administrative controls as discussed in appendices B4-B and B4-C will be required.

d. Assistance in the determination of which hearing protective device, or combination of devices, suitable for use in each situation, is available from an occupational audiologist, industrial hygienist, or occupational medicine physician. Hearing protection recommendations are contained in the baseline and periodic industrial hygiene surveys. Every effort shall be made to issue personal hearing protective devices suited to the location and duration of usage following the guidance contained in appendix B4-D. Appendix B4-D identifies standard stock hearing protective devices. Alternative hearing protective devices that have been evaluated and approved by one of the military services are identified on the Navy Environmental Health Center (NEHC) homepage at http://www-nehc.med.navy.mil

e. For situations requiring unique hearing protection devices, guidance and approval shall be requested from Chief, Bureau of Medicine and Surgery (BUMED).

f. In cases where an industrial hygienist, occupational medicine physician or occupational audiologist determines that hearing protective devices do not provide sufficient attenuation to reduce the individual's effective exposure level to below 84 dB(A), administrative controls as discussed in appendices B4-B and B4-C will be required.

B0407. HEARING TESTING AND MEDICAL EVALUATION

Personnel who are routinely required to work in designated noise hazardous areas or with labeled noise hazardous equipment shall be entered into HCP. Appendix B4-A provides detailed information on hearing testing.

a. Reference (Baseline) Hearing Tests. All personnel shall receive a baseline hearing test upon entry into naval service recorded on a reference audiogram (DD Form 2215). Hearing tests performed at military entrance processing stations (MEPS) shall not be used as a baseline hearing test.

b. Monitoring Hearing Tests. All personnel assigned to duties in designated noise hazardous areas or operating noise hazardous equipment shall be included in HCP. These persons shall receive a hearing test annually, beginning within one year of assignment to those duties, unless their exposure has been found to be of insufficient intensity and/or duration to require enrollment, based on a noise survey or the written opinion of an appropriate occupational health professional. Test results shall be uploaded to the DOEHRS-HC central data repository as well as recorded on a Hearing Conservation Data Form (Form DD 2216). Placement in HCP and annual hearing tests and appropriate follow-up testing shall continue for as long as the person remains in a noise hazardous environment.

c. Termination Hearing Tests. Personnel shall receive a hearing test upon termination of service.

d. Other Hearing Tests. Hearing tests performed for reasons other than hearing conservation or routine physicals, such as complaints of hearing difficulties, difficulty

understanding conversational speech or a sensation of ringing or fullness in the ear(s), shall be performed as indicated by a medical provider. The results of these tests should be recorded on a standard form (SF 600) and maintained in the health record.

B0408. TRAINING

a. All personnel included in HCP shall receive training relative to HCP prior to working in noise hazardous areas or with noise hazardous equipment and annually thereafter. Initial training topics shall include:

(1) The elements and rationale for HCP including the effects of noise on hearing.

(2) Designated noise hazardous areas and equipment.

(3) Proper use and maintenance of hearing protective devices, including the advantages and disadvantages of each type of device.

(4) The necessity for periodic hearing testing, and a description of test procedures.

(5) Mandatory requirement to wear assigned protective equipment, and administrative actions that may result from failure to comply.

(6) Off-duty hearing health hazards.

(7) The effects of hearing loss on career longevity, promotion and retention.

(8) Communication in high-noise environments.

b. Annual refresher training must be conducted for personnel enrolled in the HCP. Often this training is accomplished in conjunction with the annual audiogram. Reference B4-2 identifies suitable training materials and provides additional guidance.

B0409. RECORDKEEPING

a. Results of hearing tests performed for hearing conservation purposes and the results of exposure assessments shall be permanently recorded, uploaded to the defense occupational health readiness system-hearing conservation (DOEHRS-HC) data repository and retained in the member's health record. Baseline and reference audiograms which have been superseded as a result of the follow-up process shall be retained in the individual's health record along with relevant evaluation, disposition and referral notations.

b. Activities that do not use DOHRS-HC should contact the Navy Environmental Health and Training Center (NAVENVIRHLTHCEN) for guidance in including test data in the hearing conservation database.

c. The MDR shall maintain a current roster of personnel who routinely work in designated noise hazardous areas and shall update this roster semi-annually. The MDR shall maintain a "tickler file" for scheduling annual audiometric examinations of these personnel. The MDR shall update the "tickler file" monthly with the results of the audiometric exams.

d. Accordance to the reporting requirements of reference B4-1, an entry into the web-enabled safety system (WESS) must be made for any work-related STS in hearing. This pertains to a STS averaging 10 dB or more at 2000, 3000, and 4000 Hz in one or both ears, and the person’s total hearing level is 25 decibels or more above audiometric zero in the same ears (averaged at 2000, 3000, 4000 Hz). Names are not to be added if an audiologist, otologist, or occupational medicine physician confirms the shift is not of occupational origin. When a reportable hearing loss occurs from an instantaneous event (e.g., acoustic trauma from a one-time blast or over-pressure) the hearing loss shall be reported as an injury.

CHAPTER B4

REFERENCES

B4-1. OPNAVINST 5102.1D/MCO P5102.1B, Navy and Marine Corps Mishap and Safety Investigation, Reporting, and Recordkeeping Manual

B4-2. NEHC Technical Manual, TM-6260.51.99-2, Navy Medical Department Hearing Conservation Program Procedures

B4-3. NEHC Technical Manual, TM-6290.91-B, Industrial Hygiene Field Operations Manual

B4-4. American National Standard Specification for Sound Level Meters, S1.4A-1985, American National Standards Institute (NOTAL -- Should be held by commands with sound level meters).

B4-5. American National Standard Specification for Personal Noise Dosimeters, S1.25-1991, American National Standards Institute (NOTAL -- Should be held by commands with personal noise dosimeters).

B4-6. DoD Instruction 6055.12, DoD Hearing Conservation Program (HCP) (NOTAL), of 5 March 2004

B4-7. American National Standard Specification for Audiometers, S3.6-1989, American National Standards Institute (NOTAL -- Should be held by commands with audiometers)

B4-8. OPNAVINST 4720.2G

B4-9. NAVSEA T9640-AB-DDT-010/HAB, Shipboard Habitability Design Criteria Manual (NOTAL)

Appendix B4-A

HEARING CONSERVATION DETAILED INFORMATION

This appendix provides detailed information regarding hearing conservation that will be of value to the ship's Medical and Safety Departments.

1. Navy Occupational Exposure Level (NOEL). The NOEL for occupational exposure to noise is listed below:

a. For an eight-hour time-weighted average (TWA) of 84 decibels on the A-weighted scale (dB(A)) for frequencies of 20 to 16,000 Hertz (Hz)

b. For periods of less than 16 hours in any 24-hour period, the NOEL can be determined from the following equation:

$$T = 16/(2^{([(L - 80)/4])})$$

Where: T = time in hours (decimal)

L = effective sound level in dB(A)

NOTE:

When two or more periods of noise exposure of different levels comprise the daily noise exposure, their combined effect must be considered. If the sum of the following expression exceeds unity (i.e., >1), then the mixed exposure exceeds the NOEL:

$$C1/T1 + C2/T2 + \ldots Cn/Tn$$

Where C indicates the total time of exposure at a specified noise level and T represents the time of exposure permitted at that level.

c. For impact or impulse noise - 140 dB(A) peak sound pressure level.

d. When TWA exposures are likely to exceed 84 dB(A), then personnel shall be included in Hearing Conservation.

2. Noise Measurements and Exposure Assessments. To effectively control noise it is necessary to accurately measure noise according to standard procedures and properly evaluate the measurements against accepted criteria.

a. Noise Measurements. Noise measurements shall be taken as a part of the industrial hygiene survey described in chapter A3.

(1) Sound level meters shall conform, at a minimum, to the Type II requirements cited in reference B4-4. An acoustical calibrator, accurate to within plus or minus one decibel, shall be used to calibrate the instrument before each survey and to revalidate the calibration at the conclusion of the survey. The sound level meter and acoustical calibrator will be electroacoustically calibrated annually. Contact NAVENVIRHLTHCEN Norfolk to schedule the calibration of this equipment.

(a) Continuous or intermittent steady state noise shall be measured in dB(A) with a sound level meter set for slow response. Whenever levels in excess of 84 dB(A) are recorded, C-weighted measurements, dB(C) shall also be taken to permit more accurate determination of hearing protector attenuation requirements.

(b) Impact or impulse noise shall be measured as dB peak sound pressure level (reference: 20 μPa) with an instrument capable of accurate impact noise measurement. Reference B4-4 provides specific details.

(2) In cases where high worker mobility, significant variations in sound levels, or a significant component of impulse noise make area monitoring generally inappropriate, personal dosimetry shall be conducted. Personal noise dosimeters shall meet the class 2A-84/80-4 requirements of reference B4-5 and have an operating range of at least 80 dB(A) to 130 dB(A). The assessment of dosimetry results must consider how representative the measured exposure is of the exposure anticipated over longer time periods.

(3) Work environments found to have noise levels greater than 84 dB(A) (continuous or intermittent), or 140 dB peak sound pressure level for impact or impulse noise shall be

analyzed to determine the potential hazard and shall be resurveyed within 30 days of any significant modifications or changes in work routine which could impact/alter the noise intensity/exposure level.

(4) All noise measurements taken to determine an individual's exposure shall be conducted with the microphone of the measuring instrument placed at a height which most closely approximates the position/location of the worker's ear during normal working conditions. Repeated measurements may be required during a single day and/or on different days of the week to account for the variations in noise levels produced by changes in operational schedules and procedures.

(5) The record of noise measurements shall be kept by the measuring activity for a period of 50 years. If measurements are made by a ship's IHO, the records shall be turned over to a supporting shore medical activity for retention. The shore activity will establish a file for each ship. Records shall include, as a minimum the number, type, and location of the noise sources; number and identification of personnel in the work area and their daily noise exposure and duration; type, model, serial number of test equipment, and calibration data; location, date, and time of noise measurements; noise levels measured and hazard radius; and the name and signature of the person(s) who made the survey. Noise survey data will be recorded on NEHC 5100/17 and 5100/18 forms or using a computer-generated equivalent containing all the data fields of these forms.

b. Exposure Assessment. The specialized equipment to be used by an industrial hygienist or occupational audiologist may include octave band analyzers, recorders and personal noise dosimeters.

(1) The criteria outlined in paragraph 1, Navy occupational exposure limits (NOEL) shall be used to determine the degree of compliance with applicable standards.

(2) A noise hazardous area is defined as:

(a) Any work area where the A-weighted sound level (continuous or intermittent) is routinely greater than 84 dB(A).

(b) Any work area where the peak sound pressure level (impulse or impact noise) routinely exceeds 140 dB.

NOTE:

Routinely is defined as those areas/equipment where the noise is of sufficient intensity and duration that it can reasonably be expected exposure will result in a loss of hearing sensitivity.

(3) Noise hazardous equipment is that which produces sound levels greater than 84 B(A) or 140 dB peak sound pressure level.

(4) Per reference B4-6, eight-hour time-weighted average (TWA) noise levels shall be determined for all personnel working in noise hazardous areas at least once during assignment and within 30 days of any change in operations affecting noise levels.

(5) A risk assessment code (RAC) shall be assigned to all potentially hazardous noise areas and operations (see chapter A4). This will normally be accomplished as part of the industrial hygiene surveys described in chapter A3.

(6) Since there are a wide variety of noise measuring instruments in use, any one of the following methods should be used. In each case, it is necessary to take a sufficient number of measurements to achieve a representative noise sample.

(a) When using a dosimeter that is capable of C-weighted measurements:

1. Obtain the C-weighted dose for the entire workshift, and convert to TWA sound level (see dosimeter instruction manual for conversion table).

2. Subtract the NRR from the C-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(b) When using a dosimeter that is not capable of C-weighted measurements, the following method may be used:

1. Convert the A-weighted dose to TWA (see dosimeter instruction manual).

2. Subtract 7 dB from the NRR value.

3. Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(c) When using a sound level meter set to the A-weighted network:

1. Obtain the A-weighted TWA.

2. Subtract 7 dB from the NRR and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(d) When using a sound level meter set on the C-weighting network:

1. Obtain a representative sample of the C-weighted sound levels in the environment.

2. Subtract the NRR from the C-weighted average sound level to obtain the estimated A-weighted TWA under the ear protector.

The effective reduction of any combination of insert plugs with circumaural muffs (double protection) is considered to be approximately 30 dB. If the result of subtracting the estimated reduction value of a particular device or combination of devices from the measured workplace sound level is determined to be below 84 dB(A) or 140 dB peak, the protection is considered to be adequate. However, should the eight-hour (protected) TWA exceed 84 dB(A), administrative controls shall be instituted to reduce personnel exposure to acceptable levels.

c. Removal of Personnel from Hearing Conservation. A conservative approach will be taken in making a decision to remove personnel from hearing conservation.

(1) Judgments shall be based on repeated and representative measurements that indicate that the individual is exposed to less than 70 percent noise dose or has an eight-hour time-weighted average (TWA) of less than 82 dB(A). This ensures,

with an approximate 95% confidence level, that individuals will not be overexposed.

(2) Recommendations for removal of individuals who are already included in the hearing conservation will be made only by professionals qualified to perform or evaluate noise exposure assessments. In no case will individuals already included in hearing conservation be disenrolled based upon exposure assessment alone without concurrence from an audiologist or qualified physician. Such concurrence is necessary to avoid exclusion of personnel who are noise susceptible or at exceptional risk due to pre-existing hearing loss. See paragraph 4d for hearing tests for personnel being removed from hearing conservation.

3. Personal Hearing Protective Devices. In cases where personal hearing protection devices do not sufficiently reduce personnel effective exposure levels to less than 84 dB(A) administrative control of exposure time will be necessary. A table of noise exposure limits is found in appendix B4-B.

4. Hearing Testing and Medical Evaluation

a. **Hearing Test.** Audiometers used in the performance of hearing tests shall conform to the standards defined in the most current edition of reference B4-7. Hearing tests shall be pure tone, air conduction hearing threshold examinations to include, as a minimum, test frequencies of 500, 1,000, 2,000, 3,000, 4,000 and 6,000 Hz and shall be taken separately for each ear. Tests shall be performed by an audiologist, otolaryngologist, qualified physician or by a person certified by the NAVENVIRHLTHCEN Norfolk or the equivalent organization of another U.S. military service. Hearing tests shall be conducted in an audiometric chamber with internal ambient sound levels not exceeding those prescribed in reference B4-6.

(1) Audiometric booths must be certified annually by an industrial hygienist, audiologist or other qualified personnel under their direct supervision.

(2) The use of noise excluding audiometric earphones is not permitted to augment the performance of a deficient (e.g., non-certifiable) audiometric test room. Their use for

minimizing ambient noise masking effects during testing is allowed within a certified room.

b. **Reference (Baseline) Hearing Tests**

(1) All personnel included in hearing conservation program shall have a reference hearing test (form DD 2215) in their medical record.

(2) All reference hearing tests shall be preceded by at least 14 hours without exposure to workplace noise. This requirement may not be met by wearing hearing protective devices. Reference (baseline) hearing tests will not be conducted if there is evidence of a transient medical condition that would affect hearing threshold.

(3) Personnel who do not have a reference audiogram filed in their health record shall not be assigned to duty in a designated hazardous noise area involving exposure to hazardous noise until a reference hearing test has been performed. In these cases, hearing threshold levels in either ear in the excess of an average of 25 dB for the frequencies of 500 - 3000Hz or 45dB at any frequency greater than 4000Hz must be evaluated by an audiologist.

c. **Monitoring Hearing Test.** All personnel included in hearing conservation program will receive annual monitoring hearing tests for as long as they remain enrolled, unless otherwise indicated in the following paragraphs. Additional hearing tests may also be conducted when there are individual complaints of hearing difficulties (e.g., difficulty in understanding speech or a sensation of ringing or fullness in the ear(s)). At the discretion of an audiologist or medical officer, evaluation and medical record entries will be necessary to discover and document the existence of occupational versus non-occupational etiology.

NOTE:

All personnel shall bring their personal hearing protective devices with them when they report for monitoring audiometry.

(1) Consult reference B4-2 for detailed Medical Department guidance for the provision of monitoring audiometry,

follow-up testing, and case management of personnel with noise-induced hearing loss.

(2) The monitoring audiogram shall be compared to the most current reference audiogram to determine if a significant threshold shift (STS) has occurred.

(a) Significant threshold shift (STS) is defined as a change of 15 dB or greater at any test frequency from 1000 to 4000 Hz in either ear or a change in hearing averaging 10 dB or more at 2000, 3000 and 4000 Hz in either ear.

(b) When an STS is identified, additional monitoring hearing tests shall be performed to determine if the threshold shift is temporary or permanent in nature. The member's division officer or MDR will be informed of the time and place for follow-up testing.

(c) A significant threshold shift will be considered permanent when so determined by an audiologist or appropriately trained physician. Individuals will be informed in writing within 21 days of any permanent threshold shift toward deteriorated hearing. When the permanent threshold shift results from exposure to hazardous noise levels, the hearing loss shall be reported to the safety officer and department head by memo that a possible breach in the hearing conservation control procedures has occurred, resulting in a hearing loss.

(3) Any individual who has hearing loss in both ears in which the sum of thresholds at the frequencies of 3000, 4000 and 6000 Hz exceeds a total of 270 dB or has their reference hearing test (form DD 2215) re-established three times will not be assigned to duties involving exposure to hazardous noise until evaluated and waived by an audiologist, otologist, or occupational medicine physician.

d. **Removal Hearing Tests.** Individuals who are removed from hearing conservation will be given a hearing test to document auditory status at the time of removal from noise hazardous duties. Results of this test will be recorded on DD 2216.

e. **Disposition Following Monitoring Hearing Tests.** Pure tone air conduction monitoring hearing tests are designed to

detect small changes in hearing and identify problems before the individual suffers hearing loss that interferes with verbal communications. Detection is made by comparing the current monitoring audiogram with the reference audiogram to determine STS.

(1) Annual

(a) If the annual audiogram shows no significant threshold shift, the individual shall be returned to duty and recalled for hearing testing in one year.

(b) If the annual audiogram shows STS toward improved hearing, then the individual should be re-tested immediately to determine if the baseline/reference test was in error, hearing has actually improved, or the annual test was invalid. If the repeat audiogram continues to show STS and is plus or minus 5 dB from the annual test, re-establish the reference based on the first follow-up test and repeat the test in one year. Nothing else is required.

(c) If the annual audiogram shows a significant threshold shift toward deteriorated hearing, then the individual must be re-tested following at least 14 hours of exclusion from noise levels in excess of 80 dB(A). Because the presence of a STS implies that hearing protective equipment used may be inadequate, physical exclusion from noise may not be accomplished by the use of hearing protective equipment. The physical exclusion period is referred to as "auditory rest." The required 14 hours of "auditory rest" is usually sufficient to allow a temporary STS to return to pre-exposure levels.

(2) Follow-up No. 1

(a) If the first follow-up audiogram shows no significant threshold shift relative to the reference audiogram (i.e., STS has resolved), personnel shall have their hearing protective devices refitted, be re-indoctrinated in their use, and returned to duty to be recalled for a hearing test in one year.

(b) If the first follow-up supports the existence of STS, then a possible conductive or mechanical basis for the shift must be ruled out before proceeding with follow-up. The preferred method to rule out conductive hearing loss is through

screening tympanometry and otoscopy, provided by the audiometric technician or MDR. Subjects who demonstrate normal otoscopy and tympanometry should have that fact noted on a SF 600, and may then immediately receive their second follow-up hearing test. If tympanometry is unavailable, then any health care provider can provide examination and clearance to continue the audiometric test sequence. Otoscopic/tympanometric anomaly requires medical evaluation prior to resuming the test sequence. Again, the second follow-up may be given on the same day as the first follow-up if middle ear function is normal.

(c) At any point in the monitoring process, a health care provider has the option of discontinuing the sequence and referring the patient to an audiologist for further evaluation, if results appear invalid or a severe condition is suspected.

(3) Follow-up No. 2

(a) If the second follow-up test shows no STS relative to the reference audiogram, personnel shall have their hearing protective devices refitted, be re-trained in their use, and be returned to duty.

(b) If the second follow-up test continues to show STS relative to the reference audiogram, the health care provider will refer the individual for diagnostic evaluation or consultation with an audiologist. However, for personnel who continue to demonstrate essentially normal hearing sensitivity despite their threshold shift, the audiologist or suitably trained physician who would otherwise receive the referral may elect to provide a written protocol for case management. The protocol may include the option of shipboard counseling and revision of the reference audiogram without additional testing or review.

f. **Re-established Reference Audiograms**. Monitoring audiograms are compared to the baseline or reference audiogram to determine changes in hearing levels. When, in the opinion of an audiologist or medical officer, the change in hearing (for the better or worse) is permanent, a new reference audiogram may be established for future hearing level comparisons. This re-established reference audiogram does in no way replace the original baseline or reference audiogram established at the

start of service, which may still be used to determine hearing losses at the termination of military service.

g. **Termination Hearing Tests**. Personnel shall receive a hearing test upon termination of service.

Appendix B4-B

ADMINISTRATIVE CONTROL OF NOISE EXPOSURE WITH HEARING PROTECTIVE DEVICES (STAY TIME)

Limiting time (hr: min per 24 hour day)				
Sound level	Hearing protector noise reduction (dB)			
dB(A)	10	20	30	40
90	16	--	--	--
94	8	--	--	--
98	4	--	--	--
102	2	11:18	--	--
106	1	5:39	--	--
110	0:30	2:49	16	--
114	0:15	1:25	8	--
118	--	0:42	4	--
122	--	0:21	2	11:18
126	--	--	1	5:39
130	--	--	0:30	2:49
134	--	--	0:15	1:25
138	--	--	--	0:42

NOTE: Values other than those given above may be calculated using the formula:

$$T = 16/(2^{([(L-80)/4])})$$

Where: T = Time in hours (decimal)
L = Effective sound level, (dB(A))

Intermediate values may be interpolated by adding or subtracting the decibel difference to the appropriate column.

Appendix B4-C

ADDITIONAL NOISE ABATEMENT INFORMATION

1. Introduction. The primary means of protecting Navy personnel from hazardous noise levels shall be through the application of engineering controls. Administrative controls (e.g., the adjustment of work schedules to limit exposure) are also effective but often result in some loss in productivity. Personal protective equipment (earplugs or muffs) shall be the permanent solution only when engineering or administrative controls are considered to be infeasible or cost prohibitive. General hazard (including noise) control techniques are discussed in more detail in chapter A3; therefore, this chapter will address only specific concepts.

2. Preventive Measures. It is much less costly to eliminate potential noise problems in the design or procurement stage for new processes, equipment, and facilities than it is to make retrofits or modifications after the fact. The following guidance is provided to meet this objective.

a. **Procurement specifications** for all new machinery and equipment to be located in spaces where personnel are required to perform work shall prescribe the noise emission level that will ensure, within reasonable accuracy, an A-weighted sound level of 84 dB or less at all locations in which personnel are required to work.

b. **New ship design**

(1) Low noise emitting equipment and acoustical treatment shall be incorporated during the various design stages for all new construction ships so that the equivalent noise level at watch-stander stations is less than 84 dB(A) under full power operating conditions.

(2) Procurement specifications for all new machinery and equipment to be located in spaces where personnel are required to perform work shall prescribe the noise emission level that will ensure an A-weighted sound level of less than 84 dB at all locations in which personnel are required to work.

c. **Repeat ship design.** The policy cited above shall apply and incorporate the noise control technology and personnel noise dosages learned from previous ship designs.

d. **Ship alteration.** Ship alteration prioritization policy established in reference B4-8 shall form the basis of selecting ships for noise control. All watch-stander stations in machinery spaces will not exceed a maximum, equivalent noise level of 84dB(A) under full power operation conditions. Where achieving no more than 84 dB(A) under full power operating conditions is not economically and technologically feasible, watch-stander stations will not exceed a maximum, equivalent noise level of 90 dB(A) at sustained speed operating conditions.

e. The policy stated in paragraphs 2b, c, and d does not apply to high performance ships, experimental ships or special purpose ships for which noise reduction technology application is not feasible. In these uniquely military situations, COMNAVSEASYSCOM, in conjunction with BUMED, will study and develop suitable noise requirements, engineering controls, and hearing protective devices to protect personnel from hazardous noise levels based on ship operating requirements and personnel rest-duty cycles.

3. Abatement of Existing Noise Hazards

a. Abatement of hazardous noise levels shall be undertaken, to the extent possible or practicable, by one or more of the following methods:

(1) By engineering design to eliminate or reduce the noise level of machinery, equipment, and other operating devices/facilities to acceptable levels.

(2) By damping the noise by means of lamination, mufflers, mountings, couplings, supports, insulation or application of acoustic materials.

(3) By acoustical enclosure of the noise producer.

(4) By isolation of the noise producer to a point where the noise will affect fewer personnel.

(5) By substitution of less noisy operations (e.g., welding in lieu of riveting).

(6) By administrative controls which limit exposure (e.g., control of work schedules).

4. Airborne Noise Criteria for Navy ships and submarines.

In accordance with reference B4-9, noise levels have been established as acceptable compartment noise levels for habitability and occupational health. They are categorized according to personnel functional requirements and apply under all ship operating conditions. These criteria apply to steady-state noise and do not apply to impact or impulsive type noise. This information is provided to aid in assessing noise abatement priorities.

a. Definitions of Airborne Noise Categories.

(1) Category A. Spaces in which direct speech communication must be understood with minimal error and without need for repetition. Acceptable noise levels are based on approximate talker-listener distances of either three feet or twelve feet. Category A-3 shall be assigned when extreme talker-listener distance is less than six feet. Category A-12 shall be assigned when the extreme talker-listener distance is six feet or greater. A-3 or A-12 designators are dependent on compartment size and arrangement which influence talker-listener distances.

(2) Category B. Spaces in which comfort of personnel is the primary consideration.

(3) Category C. Spaces in which it is essential to maintain especially quiet conditions.

(4) Category D. High noise level areas in which prevention of hearing loss is the primary consideration.

(5) Category E. High noise level areas in which voice communication is at high vocal effort and short distance and where amplified speech mechanisms and telephones are normally available.

b. Noise Category Assignments. Airborne noise categories are based upon the functional requirements of shipboard spaces. Typical assignments are identified below. Ship spaces not specifically listed shall be assigned the same airborne noise category as a listed space which supports a similar function.

(1) Category A-12.
Air traffic and tactical control centers
Briefing rooms
Chart room
Bridge/Pilot House
Combat information center (CIC)
Communication
Control center
Enclosed operation station
Missile compartment
Squadron ready room
Training space
Wardroom mess and flag officer’s mess and lounge

(2) Category A-3.
Chart room
Close-in Weapon System (CIWS) control room
Conference room
Computer room and DPC
Control rooms
Damage control central
Dental/medical offices
Electronic shop
Maneuvering room
Missile compartment
Missile control center
Offices
Radio room

(3) Category B.
Barber shop
Berthing and living spaces
Library multimedia resource center
Lounges
Medical wards
Messrooms
Recreation areas
Ship store

(4) Category C.
Chapel and chaplain offices
Libraries
Medical spaces
Sonar control room or areas

(5) Category D.
Auxiliary machinery rooms
Document destruction room
Electronic equipment space (Note 1)
Engine rooms
Fire rooms
Galley spaces
Laundry spaces
Main machinery rooms
Passages
Power supply/power conversion room
Scullery
Steering gear room
Storerooms, unmanned/unoccupied (Note 2)
Workshops (Note 3)

(6) Category E.
Armory/magazine/munitions storeroom/weapons stowage areas
Boatswain workshop (Note 4)
Bridge wings
Decontamination station
Electronic equipment space (e.g., radio and radar equipment rooms) (Note 1)
Enclosed operating station (if not feasible to meet category A-12)
Flag bridge
Issue rooms
Officer of the deck stations
Open bridge and topside watch stations
Physical fitness spaces
Propulsion plant maneuvering areas
Refueling and replenishment stations
Repair lockers
Signal bridge and signal shelter
Torpedo room
Workshops (Note 3)

NOTE 1: Wherein command communications do not occur and no routine operator attention to the equipment is required.

NOTE 2: Except for rooms which contain hazardous materials such as munitions and flammable liquids.

NOTE 3: Except wherein hazardous materials are handled or a high degree of concentration is necessary, e.g. electronic repair workshop, decontamination workshop, CIWS workshop [with repair equipment secured].

NOTE 4: If normally occupied or used as an issue room, with repair equipment secured.

(3) Acceptable Airborne Noise Levels. The following indicates acceptable "A" weighted airborne noise levels for all shipboard categories. For design, engineering, and procurement purposes, other more detailed or specific criteria, such as octave band, may be used to supplement these A-weighted criteria.

Noise Category Level	Sound Pressure Level (dBA)
A-12	60
A-3	70
B	65
C	60
D	84
E	75

Appendix B4-D

HEARING PROTECTIVE DEVICES

This table identifies standard stock hearing protective devices. Alternative hearing protective devices that have been evaluated and approved by one of the military services are identified on the Navy Environmental Health Center (NEHC) homepage at (http://www-nehc.med.navy.mil/occmed/index audiology.htm) under Hearing Protection

	Manufacturers Nomenclature/NSN	Type of Protector	Federal Nomenclature
1	Ear Defender V-51R 6515-00-442-4765	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (X-Small) (White)
2	Ear Defender V-51R 6515-00-467-0085	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (Small) (Green)
3	Ear Defender V-51R 6515-00-467-0089	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (Medium) (Intl. Orange)
4	Ear Defender V-51R 6515-00-442-4807	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (Large) (Blue)
5	Ear Defender V-51R 6515-00-442-4813	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (X-Large) (Red)
6	Comfit, Triple Flange 6515-00-442-4821	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (Small) (Green)
7	Comfit, Triple Flange 6515-00-442-4818	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (Medium) (Intl. Orange)
8	Comfit, Triple Flange 6515-00-467-0092	Insert Earplug (sized)	Plug, Ear, Noise Protection 24's (Large)(Blue)

	Manufacturers Nomenclature/NSN	Type of Protector	Federal Nomenclature
9	Silaflex (Blister Pack) 6515-00-133-5416	Non-Hardening Silicone	Plug, Ear, Noise Protection, Cylindrical, Disposable 200's
10	EAR or Deci-Damp 6515-00-137-6345	Foam Plastic Insert	Plug, Ear, Noise Universal Size, Yellow 200 pr
11	Sound-Ban 6515-00-392-0726 6515-00-181-8058	Headband, Earcaps	Plug, Ear, Hearing Protection Universal Size
12	Straightaway Muffs 4240-00-759-3290 4240-00-674-5379 4240-00-979-4040	High Performance Circumaural Muffs For 9 AN/2 For 9 AN/2	Aural Protector Sound 372-9 AN/2 Replacement Filler, Dome Replacement Seal, Dome
13	Ear Plug Cases 6515-01-100-1674		Case, Earplug
14	Circumaural Muff 4240-00-22-2946	Type II Headband/Napeband	Aural Protector, Sound

POSITIVE AND NEGATIVE FEATURES OF HEARING PROTECTIVE DEVICES

Type Wear	Positive	Negative	Length of Wear
Earplug (V-51R or Triple Flange)	After adaptation can be used for long periods. Relatively inexpensive	Individual fitting by medical personnel. May cause initial soreness/irritation	Long term (3-4 hours)
Headband Ear Caps (Sound-Ban)	Quickly fitted without touching	Uncomfortable after 1 hour	Short term. Easily carried
Circumaural Muffs	Comfortable. May be worn over plugs. Most universal fit for most users	Expensive. Heavy. Difficult to carry. Fit may be compromised by long hair or eyeglasses	Long or short-term

One single type of hearing protective device will not meet the needs of all noise-exposed personnel. The appropriate type of hearing protective device should be selected based upon a consideration of the factors listed above in

addition to the degree of attenuation required in a particular situation. The most convenient method of making this determination is the Noise Reduction Rating (NRR) developed by the Environmental Protection Agency (EPA). The NRR is usually shown on the hearing protector package. The NRR is then related to an individual worker's noise environment in order to assess the adequacy of the attenuation of a given hearing protector.

CHAPTER B5

SIGHT CONSERVATION

B0501. DISCUSSION

a. Navy policy requires that personnel working in eye-hazard areas or operations are provided adequate eye protection at government expense. Examples of potentially eye hazardous operations are: warfighting and operational training, cutting and welding, drilling, grinding, milling, chipping, sand blasting, or other dust and particle producing operations and pouring or handling molten metals or corrosive liquids and solids. Personnel in the immediate vicinity of such operations or entering a posted eye hazard area shall wear eye protective equipment.

b. Devices for eye protection, such as safety glasses, chipper's goggles, welder's goggles, chemical goggles, and face shields, shall be selected using the guidance provided in appendix B5-A. This appendix complies with references B5-1 through B5-4. As a minimum, the protective devices provided shall be approved by the American National Standards Institute (ANSI), labeled "Z87" or "Z87+" in the case of ballistic eye protection devices, and adequate for the hazards specified.

c. Refer to specific chapters for eye protection guidance.

B0502. PROGRAM RESPONSIBILITIES

a. The commanding officer shall:

(1) Ensure that an effective sight conservation program is established within his or her command.

(2) Place emphasis on leadership by example regarding wearing of sight protection equipment.

b. The safety officer shall:

(1) Evaluate areas, processes, and equipment for sight hazards if not previously evaluated or modifications have been

made. Determine appropriate sight protective equipment per the baseline industrial hygiene survey, or appendix B5-A. Assistance may be requested from an industrial hygienist if difficulty in making such a determination is experienced.

(2) Maintain a current listing of all areas and processes that require eye protection and those areas that require eye wash or deluge shower facilities. A list of eye hazardous areas and processes and eye wash or deluge shower requirements is provided in the baseline industrial hygiene survey, and shall be updated as needed.

(3) Evaluate the program at least annually. A checklist for program evaluation is provided in appendix B5-B.

c. Division officers shall:

(1) Ensure that areas identified as eye hazardous are properly marked and labeled per paragraph B0504.

(2) Ensure personnel use proper eye protective devices when required.

(3) Ensure that personnel who work in eye hazard areas or operations are trained on the need for and proper use of protective eyewear and on the location and use of eyewash and deluge shower facilities.

(4) Refer personnel who wear corrective eyewear and work in eye hazard areas to obtain prescriptive safety eyewear via the medical department.

d. The medical department representative (MDR) shall provide personnel who require corrective lenses and work in eye hazard areas, with prescription eyewear. Safety eyewear must have permanent side shields that meet the ANSI test requirements for that specific frame. These side shields are not to be removed by employees.

NOTE:

Ballistic eye protection spectacles systems have built-in side impact protection that is part of the primary protector shield.

e. All hands shall:

(1) Comply with posted eye hazard warning labels.

(2) Properly wear required eye protective equipment.

B0503. SIGHT CONSERVATION ELEMENTS

a. List of eye hazard areas and processes.

b. Medical screening.

c. Issue and maintenance of sight protection equipment (paragraph B0506).

d. Procedures for the use and issue of temporary protective eyewear (paragraph B0507).

e. Establishment of emergency eyewash and deluge shower facilities (paragraph B0508).

f. Training (paragraph B0509).

B0504. DETERMINATION and DESIGNATION of EYE-HAZARDOUS AREAS and PROCESSES

a. Determination. The baseline industrial hygiene survey will make an initial determination of eye-hazardous areas/processes and eye wash and deluge shower requirements, and list them in the survey report. The list shall include specific eye protection equipment requirements for each area or process. The safety officer will maintain and ensure that this list(s) remains current. The safety officer shall evaluate subsequent equipment/work processes introduced into the workplace to determine if they present an eye hazardous condition. The safety officer will request the assistance of an industrial hygienist, to assist in this determination, as needed.

b. Designation. The ship (or construction/repair yard) shall mark permanently installed equipment and processes that are eye-hazard areas with three-inch deck striping and a CAUTION sign.

(1) The deck around an immediate eye hazard shall be marked with a three-inch black and yellow striped or

checkerboard tape or similarly painted. This tape is available under NSN 9Q/9905-01-342-5934 (checkerboard) or 9Q/9905-01-342-5933 (striped). Place the deck marking around equipment operator areas in the vicinity of where the eye hazard is generated (i.e., where there are flying chips from a lathe). Avoid placing the deck markings at the entrance of a space or shop if only selected areas of the shop, while equipment is in operation, are eye hazardous.

(2) Mount the eye hazard sign directly above the hazard, component, machinery, boundary bulkhead, or door in a conspicuous location. The CAUTION sign shall conform to NSN 9Q/9905-01-100-8203, "CAUTION, Eye Protection Required in This Area." Eye hazard signs or labels are also available through open purchase. Eye hazard signs and labels are not required on individual tools. Avoid placing the signs at the entrance of a space or shop if only selected areas of the shop, while equipment is in operation, are eye hazardous.

B0505. MEDICAL SURVEILLANCE

Medical surveillance is required only for personnel covered by chapter B9.

B0506. ISSUE AND MAINTENANCE OF SIGHT PROTECTION EQUIPMENT

a. Issue. The ship shall provide and issue appropriate eye protection at government expense. The list of eye hazards the safety officer maintains identifies required eye protective equipment. All eye and face protection including safety glasses (frames), ballistic eye protection devices, chemical splash goggles, welding and chipping goggles, welding helmets, and face shields shall be labeled "Z87" or “Z87+”, indicating compliance with American National Standards Institute (ANSI) standard ANSI-Z87. Such eye and face protection equipment is available through the supply system or open purchase. Appendix B5-A contains information that describes the types of protective eyewear frequently used on board ships.

b. Prescription Protective Eyewear. As determined by the safety officer and MDR, prescription safety glasses may be necessary for some individuals. Prescription protective eyewear shall be obtained through the medical department. Open purchase

procedures may be used to obtain refractive services and prescription safety lenses. The eyewear prescription form, DD 771, or as designated by the Bureau of Medicine and Surgery (BUMED), will be used in all services and equipment procurement. The prescription and procurement forms shall be entered into the crew member's medical record. Prescription protective eyewear is only indicated when the individual is required to wear safety glasses for a significant portion of their daily work (e.g., at all times while in a shipyard or routinely machining materials). For intermittent work requiring eye protection, goggles can be worn over regular prescription glasses.

c. Maintenance of Protective Eyewear. Personnel shall maintain personal protective eyewear in a clean and fully operational condition. Before re-issue, non-corrective eye protection shall be sanitized with hot, soapy water and rinsed of all traces of soap or detergent. Eye protection equipment should then be immersed for 10 minutes in a disinfectant, rinsed, and air-dried. Personnel shall immediately report lost or damaged protective eyewear to their work-center supervisor.

B0507. TEMPORARY PROTECTIVE EYEWEAR

Where protective eyewear is necessary, the command shall provide safety glasses or goggles to visitors and others who must enter or pass through eye hazardous areas. In addition, the command shall provide them to personnel awaiting corrective/protective eyewear.

B0508. EMERGENCY EYEWASH and DELUGE SHOWER FACILITIES

Emergency eyewashes or eye/face baths are primary first aid for splashes or exposures to corrosive materials. Corrosives may cause severe and progressive damage to the eyes and skin, so immediate, on-site means of washing them from the eyes and skin is vital. Emergency eyewashes are not normally required in areas where non-corrosive liquids, irritants, metal chips, or debris may contact the eyes, since the damage normally does not progress while the person is transiting to medical attention. Emergency deluge showers are primary first aid for significant splashes of corrosives to the skin or body, in addition to the eyes.

a. The ship shall have an adequate number of properly maintained and inspected eyewash facilities, installed in locations with corrosive hazards, and properly posted with signs identifying their locations. According to reference B5-1, approved emergency eyewash equipment (permanent plumbed or portable) shall:

(1) Be capable of flushing the eyes with potable water at a minimum flow rate of 0.4 gallons per minute for 15 continuous minutes.

(2) The velocity of the water shall be low enough not to be injurious to the user's eyes. When the valve is properly set, the flow from both nozzles should meet equidistant at the center of the bowl.

(3) Shall have a one-motion (e.g., paddle or pull strap), stay-open valve, such that when activated the eyewash will remain on to allow the user to hold open their eyelids to facilitate flushing. The valve shall remain open without the use of the operator’s hands until intentionally closed.

(4) Shall be on the same level, unobstructed and easily accessible within 100 feet or 10 second travel of the identified eye hazard. For a strong acid or strong caustic, the eyewash shall be immediately adjacent to the hazard.

(5) The travel route to the eyewash shall be free of trip hazards or overhead strike hazards, and positioned in such a way as to pose no hazard to the user (e.g., near electrical fixtures, down a ladder, through a door, obstructed, in a confined area).

(6) The unit shall be positioned with the eyewash nozzle(s) not less than 33 inches or more than 45 inches above the deck, and six inches minimum from the nearest wall or obstruction.

(7) Eyewash nozzles shall be protected from airborne contaminants and debris. Whatever means is used to afford such protection (plastic caps, cups, cover) its removal shall not require a separate motion by the operator when activating the unit.

(8) The eyewash shall deliver tepid flushing water (60-100 degrees Fahrenheit). Temperatures in excess of 100 degrees Fahrenheit have proven harmful to the eyes and can enhance chemical interaction with the eyes and skin.

(9) Potable water valves to eyewash stations and deluge showers shall be locked open with a metal, tamper-proof lanyard and marked as a "W" (or "circle W") fitting.

(10) All emergency eyewash and shower equipment must be maintained through the planned maintenance system (PMS).

(11) Clearly mark eyewash stations with a green sign with white lettering stating "EMERGENCY EYEWASH STATION." These signs are available through the supply system under NSN 9905-01-345-4521. Post signs in a visible location close to the eyewash unit.

b. Eye/Face Wash Units. On surface ships, locations for eye/face ash units will be identified in the baseline industrial hygiene survey. Corrosives are frequently found in the following locations, and these areas should be evaluated for installation of an eyewash or eye/face wash unit:

(1) Main and auxiliary machinery spaces, IC gyro, battery charging areas.

(2) Medical treatment area.

(3) Chemical, water testing, and medical laboratories.

(4) Darkrooms and X-ray developing areas, if liquid chemicals are used.

(5) Hazardous material issue/storerooms, if HM is dispensed.

(6) Paint mixing and issue rooms.

(7) Other areas determine by the baseline industrial hygiene survey.

c. For propulsion plant spaces of nuclear powered submarines, eyewash bottles may be used in lieu of permanent or

portable eyewash stations and shall be readily available in nucleonics/water chemistry rooms and secondary analysis stations. Approved eyewash bottles are available through the supply system under NSN 6515-01-393-0728 or 6540-01-353-9946.

d. Combination Shower/Eyewash Units. As specified in reference B5-1, a combination of emergency shower with eyewash or eye/face wash unit with drain and stay-open valve shall be available in all areas where the eyes and skin of crew members may be exposed to corrosive materials. These locations will be identified in the baseline industrial hygiene survey. Corrosives are frequently found in the following locations, and should be evaluated for installation of a combination of emergency shower with eyewash or eye/face wash unit:

(1) Oxygen-nitrogen producer room.

(2) Battery shop or locker (wet cell testing, electrolyte handling).

(3) Combat systems areas handling Isopar® fluids.

(4) Boiler repair shop.

(5) Rubber and plastic shop.

(6) Composite material repair shop.

(7) Non-destructive test and inspection shops and other ship spaces as determined by the industrial hygiene survey.

e. Portable Eyewash Stations. For those spaces that require an emergency shower, eyewash, or eye/face wash, but where potable water and drainage is not feasible, the ship shall properly install a self-contained portable eyewash. The portable eyewash unit design must comply with the same criteria for function and installation as listed in paragraph B0508a. They may order the gravity-fed eyewash stations under NSNs 4240-01-258-1245 and 4240-01-234-1796. Use of manufacturer recommended bacteriostatic solutions or powders are optional.

f. The MDR shall examine crew members in sick bay following the emergency use of an eyewash unit or deluge shower.

g. Remotely Located Eyewash Facilities. Permanently plumbed emergency showers, eyewashes, and eye/face washes located in remote locations or minimally manned areas shall be provided with an audible alarm interlocking with the activation device of the unit. The alarm is intended to alert personnel in a manned area that someone is using an eyewash facility in a remote area and may not have anyone in the immediate vicinity to render aid. The alarm shall be located in one of the following appropriate areas: outside the protected area or shop, in the associated enclosed operating station (EOS), in a nearby manned space, or in damage control central.

NOTE:

For remotely located eyewash facilities without an audible alarm, observe the two-man rule when eye-hazard operations are performed until the alarm system is installed. A label plate shall be placed at eye level in the immediate vicinity of the alarm and shall be inscribed:

WARNING

WHEN THE EMERGENCY SHOWER (EYEWASH, EYE/FACE WASH) IN THE(SHOP OR SPACE LOCATION) HAS BEEN ACTIVATED, PROVIDE IMMEDIATE ASSISTANCE TO PERSONNEL AND NOTIFY SICK BAY.

B0509. TRAINING

The division officer or work-center supervisor shall perform training for personnel assigned to work-centers with eye hazard areas/processes at the time that protective eyewear is issued. Training materials are available through the NAVOSHENVTRACEN at www.norva.navy.mil/navosh. Topics they shall cover in the training program include:

a. Types of eye hazards.

b. Types of eye protection.

c. Eyewash location and proper use (particularly personnel working with corrosive materials).

d. Proper action when personnel experience mishaps involving particles or liquids in the eye, or use an eyewash station.

NOTE:

No attempt should be made to remove a particle lodged in the eyeball, or wash an eye that has been cut in any way. Contact the medical department immediately.

CHAPTER B5

REFERENCES

B5-1. American National Standard Practice for Occupational & Educational Eye and Face Protection ANSI Z87.1 (NOTAL)

B5-2. American National Standard Emergency Eyewash and Shower Equipment, ANSI Z358.1-2004 (NOTAL)

B5-3. Military Specification DoD-G-51510: "Goggles, Industrial, Eyecup and Lenses; Goggles, Industrial (Metric)" (NOTAL)

B5-4. Military Standard 1434: "Goggles, Industrial, Safety" (NOTAL)

Appendix B5-A

TYPES OF PROTECTIVE EYEWEAR

Appropriate eye and face protection is required in all areas that are designated as eye hazardous. A selection chart for eye and face protection for different work operations, and a welding filter shade protection chart, are shown in Tables B5-A-1 and B5-A-2. The following is a short description of the various types of protective eyewear:

a. Safety Glasses/Spectacles. Safety glasses are to be worn in those areas where there is a possibility of flying objects, particulates, or dust entering the eye. Those spectacles with suitable filter lenses are permitted for use with gas welding operations on light work and for inspections. Spectacle-type glasses are made both with and without side-shields and may have either a rigid nonadjustable or adjustable bridge. Sun glasses, rate as safety glasses and marked with "Z87", with or without side-shields, may be used for outdoor work when sun protection is desired. NOTE: safety sun glasses are not suitable as ultraviolet (UV) protection from welding, cutting, or burning operations.

b. Chemical Goggles. Chemical goggles provide the eyes and eye area with protection from liquids, splashes, mists, vapors, and spray. Goggles may consist of a flexible frame or a rigid frame with a separate, cushioned fitting surface, and are held in place with a supporting band. Chemical goggles with ventilation must be splash resistant (covered vents vice perforations).

c. Welding Goggles. Welding goggles provide protection against glare and injurious radiation, as well as from flying objects, chips, and metal splashes. Eyecup-type goggles are designed to be worn alone, while cover-type goggles are designed to fit over corrective spectacles. The lens filter of welding goggles is shaded to protect the eyes from ultraviolet, infrared, and visible rays generated by the work operations.

d. Chipping Goggles. Chipping goggles protect the eyes from relatively large flying objects generated by such operations as chipping, lathing, grinding, and chiseling.

Eyecup-type goggles may be worn alone, or cover-type goggles may be fitted over corrective spectacles.

e. Welding Helmets. Welding helmets are made up of a bowl-shaped or modified bowl-shaped device equipped with a shade 14 or greater filter. These helmets are designed for use during various kinds of arc welding and heavy gas cutting and provide the welder's eyes, face, ears, and neck with protection against intense radiation and weld spatter.

f. Face Shields. Face shields provide protection to the face and neck from flying particles, liquids, or sprays. Face shields alone do not provide adequate protection against these hazards and must be worn with protective eyewear.

g. Ballistic Eye Protection Devices. Ballistic eye protection devices provide an additional level of protection above that provided by standard safety eyewear for high impact situations. These devices may replace standard safety glasses. Ballistic eye protection devices are classified as either spectacle or goggle systems. Spectacle systems provide enough frame face form for the primary protector to double as side impact protection. Many of these spectacle and goggle systems accept optical inserts for personnel requiring vision correction. These devices and optical inserts should be qualified as a military approved ballistic protective device prior to procurement.

TABLE B5-A-1 - EYE AND FACE PROTECTION SELECTION CHART

APPLICATIONS		
OPERATION	**HAZARDS**	**PROTECTORS**
Acetylene-Burning Acetylene-Cutting Acetylene-Welding	Sparks, Harmful Rays, Molten Metal, Flying Particles	7, 8, 9
Chemical Handling	Splash, Acid Burns, Fumes	2 (For severe exposure Add 10)
Chipping	Flying Particles	1, 3, 4, 5, 6, 7a, 8a
Electric (Arc) Welding	Sparks, Intense Rays, Molten Metal	11 (In combination with 4, 5, 6, In tinted lenses, advisable)
Furnace Operations	Glare, Heat, Molten Metal	7, 8, 9, (For severe exposure, add 10)
Grinding-Light	Flying Particles	1, 3, 5, 6 (For severe exposure, add 10)
Laboratory	Chemical Splash, Glass Breakage	2 (10 when in combination with 5, 6)
Machining	Flying Particles	1, 3, 5, 6 (For severe exposure, add 10)
Molten Metals	Heat, Glare, Sparks	7, 8, (10 in combination with 5, 6, In tinted lenses, advisable)
Spot Welding	Flying Particles, Sparks severe exposure, add 10)	1, 3, 4, 5, 6 (Tinted lenses advisable, for
Warfighting, Combat and Training Operations	Projectiles, Glare, Wind Dust	DoD approved ballistic protection devices

Eye and Face Protectors Key:

1 - Goggles, flexible fitting, regular or perforated ventilation
2 - Goggles, flexible fitting, covered or indirect ventilation; or goggles, chemical
3 - Goggles, cushioned fitting, rigid body
4 - Spectacles, without side shields
5 - Spectacles, with eyecup type side shields
6 - Spectacles, semi/flat fold side shields
7 - Welding goggles, eyecup type, tinted lenses
7A - Chipping goggles, eyecup type, clear safety lenses
8 - Welding goggles, coverspec type, tinted lenses, , various shade numbers
8A - Chipping goggles, coverspec type, clear safety lenses
9 - Welding goggles, coverspec type, tinted plate lens
10 - Face shield, plastic or mesh window
11 - Welding helmet, various lenses

TABLE B5-A-2 - WELDING FILTER SHADE PROTECTION CHART

WELDING OPERATION	SUGGESTED SHADE NUMBER*
Shielded Metal-Arc Welding, up to 5/32 in (4 mm) electrodes	10
Shielded Metal-Arc Welding, 3/16 to 1/4 in (4.8 to 6.4 mm) electrodes	12
Shielded Metal-Arc Welding, over 1/4 in (6.4 mm) electrodes	14
Gas Metal-Arc Welding (Nonferrous)	11
Gas Metal-Arc Welding (Ferrous)	12
Gas Tungsten-Arc Welding	12
Atomic Hydrogen Welding	12
Carbon Arc Welding	14
Torch Soldering	2
Torch Brazing	3 or 4
Light Cutting, up to 1 in (25 mm)	3 or 4
Medium Cutting, 1 to 6 in (25 to 150 mm)	4 or 5
Heavy Cutting, over 6 in (150 mm)	5 or 6
Gas Welding (Light) up to 1/8 in (3.2 mm)	4 or 5
Gas Welding (Medium) 1/8 to 1/2 in (3.2 to 12.7 mm)	5 or 6
Gas Welding (Heavy) over 1/2 in (12.7 mm)	6 or 8
Fire Watch For Any Welding or Cutting Operation	6(minimum)(A)

*The choice of a filter shade may be made on the basis of visual acuity and may therefore vary widely from one individual to another, particularly under different current densities, materials, and welding processes. However, the degree of protection from radiant energy afforded by the filter plate or lens when chosen to allow visual acuity will still remain in excess of the needs of eye filter protection. Filter plate shades as low as shade eight have proven suitably radiation-absorbent for protection from the arc-welding processes.

NOTE:

In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the operation (spectrum).

CHAPTER B6

RESPIRATORY PROTECTION

B0601. DISCUSSION

a. Many repair and maintenance operations generate air contaminants that are dangerous if inhaled. Engineering controls (e.g., local exhaust ventilation) are the most effective methods of protecting personnel against such contaminants. However, when engineering controls are not practical or feasible, respirators are necessary to assure the protection of personnel.

b. This chapter establishes respiratory protection requirements and applies to all personnel and visitors who enter an area where respiratory protective equipment is necessary. Many of the procedures contained herein are derived from or are similar to the ones detailed in reference B6-1. This chapter does not address damage control, gas free engineering, underwater protection, or respirator use in a chemical, biological, radiological, nuclear and high-yield explosive (CBRNE) emergency response.

c. The provisions of this chapter do not apply to personnel wearing respiratory protection for the sole purpose of protection against airborne radioactive contamination associated with the naval nuclear propulsion program. Guidance for this area is found in reference B6-2.

d. For submarines. Responsibilities and procedures for respiratory protection aboard submarines are contained in paragraph B0614.

B0602. RESPONSIBILITIES

a. The commanding officer shall appoint a respiratory protection manager (RPM) in writing.

b. The respiratory protection manager (RPM) shall:

(1) Complete required training course within three months of assuming the position. Respiratory protection managers (RPM) shall attend the Respiratory Protection Program

Management Course (CIN A-493-0072) the Naval Occupational Safety and Health and Environmental Training Center (NAVOSHENVTRACEN).

(2) Ensure a baseline or periodic industrial hygiene (IH) survey has been conducted of all processes and areas where there is the risk of occupational exposure to air contaminants. The IH survey will provide recommendations on the types of respiratory protection required for various processes, areas, and situations. Industrial hygiene will provide a written respirator program evaluation during baseline and periodic industrial hygiene surveys.

(3) Ensure a sufficient supply of National Institute for Occupational Safety and Health (NIOSH) approved respirators, spare parts, and expendable supplies (e.g., cartridges and filters) are maintained to conduct routine and emergency operations. There should be a sufficient number of respirator models and sizes so that the respirator is acceptable to and correctly fits the user.

NOTE:

Respirator parts and filters are not interchangeable. Ensure that all components are of the same manufacturer (e.g., Brand X facepiece must have Brand X filters).

(4) Maintain a current roster of personnel enrolled in respiratory protection program and communicate this information to the medical department representative.

(5) Conduct respirator fit testing and document that fit testing was completed as required in paragraph B0608.

(6) Establish central control points for issuing and maintaining respiratory protection equipment. Divisions that frequently use respirators and personnel who are assigned individual respirators may maintain custody of their own respiratory protection equipment and are responsible for its proper use and storage.

(7) Inspect, clean, disinfect, store, maintain and repair respirators per paragraph B0609.

(8) Ensure breathing air meets the quality requirements of paragraph B0611.

(9) Evaluate the program at least annually. A checklist for program evaluation is provided in appendix B6-A.

c. Division officers shall:

(1) Ensure that personnel have a current fit test and are trained prior to donning a respirator. The industrial hygiene survey and workplace evaluations provide information regarding work tasks which require respiratory protection.

(2) Ensure personnel are provided with/issued required respiratory protective equipment.

d. The medical department representative (MDR) shall:

(1) Confirm that personnel, who are issued respirators have no deployment limiting medical conditions, and have a current annual preventive health assessment (PHA) per reference B6-3 (see paragraph B0613).

(2) Assist the RPM in identifying and evaluating hazards and selecting appropriate respirators, as recommended in the industrial hygiene survey.

e. Personnel issuing respiratory protective equipment shall issue respirators only to personnel who are trained, medically certified per paragraph B0613, and successfully fit tested for the respirator(s) requested.

f. All hands shall:

(1) Inspect the respirator before and after each use per paragraph B0609a.

(2) Perform a positive and negative respirator facepiece seal check prior to each use per paragraph B0607b.

(3) Report any malfunction of the respirator to their immediate supervisor.

(4) Prevent damage to or loss of respiratory protective equipment.

B0603. RESPIRATORY PROTECTION ELEMENTS

a. Appointment of and training of the respiratory protection manager.

b. The industrial hygiene survey.

c. Written standard operating procedures (SOPs) governing the selection, care, issue, and use of respirators, including worksite SOPs.

Note:

The following website includes a generic, fill-in-the-blank, Navy respirator instruction and standard operating procedures for all elements of the respirator program: http://www-nehc.med.navy.mil/downloads/IH/GENERICSOP.doc. Note that this generic SOP is based on requirements of reference B6-4, but would be helpful in writing shipboard respirator program SOPs.

d. Respirator selection (select and issue only NIOSH approved respirators).

e. Respirator availability.

f. Personnel roster.

g. Medical respirator qualification, based on current PHA (paragraph B0613).

h. Initial and annual fit testing and training.

i. Respirator issue.

j. Respirator maintenance.

k. Breathing air requirements.

l. An annual audit of the respirator program by the RPM and a written respirator program evaluation by the industrial

hygiene office performing baseline and periodic industrial hygiene surveys.

Note:

See reference B6-5 for detailed explanations of these respiratory protection elements.

B0604. TYPES OF RESPIRATORS AND THEIR APPLICATIONS

The two basic types of respirators are air-purifying and atmosphere-supplying. Illustrations of typical respirators are provided in appendix B6-B.

a. Air-purifying respirators remove air contaminants by filtering, or by absorbing them as the air passes through the cartridge. In all cases when using air-purifying respirators, adequate oxygen (19.5 percent by volume) must be present. They are available with quarter-, half-, and full facepieces with the full facepiece respirator providing a higher degree of protection than either of the others. Air-purifying respirators are available as filtering facepiece (e.g., disposable) respirators, with the filter or cartridge built-in as an integral part of the respirator, or as reusable facepieces with replaceable cartridges, filters, and pre-filters of many types. They are effective only when used with the appropriate cartridges, filters, and pre-filters for the air contaminants present. Air-purifying respirators may be either non-powered or powered air-purifying respirators (PAPRs). The non-powered type depends on the user's lungs to draw air through the purifying element during inhalation; therefore, the non-powered type has the greatest breathing resistance. The powered type is equipped with a battery-powered fan that forces air through the purifying element, thus reducing the breathing resistance and ensuring a positive pressure inside the facepiece. Whether powered or non-powered, air-purifying respirators may be subdivided by the type of contaminant they protect against as described below.

(1) Particulate air-purifying respirators use cartridges, filters, and pre-filters designed to protect against inhalation of aerosols (e.g., solid or liquid particles dispersed in air). The cartridges, filters, and pre-filters remove nuisance (e.g., non-toxic) and toxic dusts, fogs, fumes, mists, smokes and sprays either singly or in combination. NIOSH

certifies respirators per reference B6-6(see paragraph B0605). Under reference B6-6, there are nine classifications of non-powered particulate air-purifying respirators certified under three filter classes: N-, R- and P- class. Each class has three levels of filter efficiency: 95%, 99% and 99.97% (designated 100 in this system). N100, R100, and P100 filters are equivalent to high efficiency particulate air (HEPA) filters. P-class series filters can be used in oil aerosols and are the only magenta (purple) colored high efficiency filters. N-class series filters cannot be used in oil aerosols. R-class series filters can be can only be used for a single shift in oil aerosols. PAPRs must be equipped with filters meeting the criteria for HEPA filters but the filters must have a reference B6-6 approval label. Like the P100 filters for negative pressure, air-purifying respirators, PAPR HEPA filters are magenta in color. Surgical masks(blue or green) do not provide protection against air contaminants. They are for **MEDICAL/DENTAL USE ONLY** and must **NEVER** be used as an air-purifying respirator.

(2) Gas and vapor air-purifying respirators use cartridges and canisters that remove contaminants through absorption and adsorption. Typically, a cartridge removes a specific type or class of gas or vapor (e.g., organic vapors or acid gases).

(3) Combination cartridges and canisters are available which combine the removal capabilities of two or more type cartridges in a single cartridge (e.g., organic vapor and particulate removal, acid gas and organic vapor removal, or acid gas, ammonia, and organic vapor removal). Some manufacturers allow users to create their own combination cartridges by screwing two cartridges together; however, always follow the manufacturer's recommendations when doing this since there may be some limitations.

(4) **Prefilters.** All manufacturers allow the user to combine different degrees of particulate removal with any cartridge by attaching a pre-filter to the cartridge by means of a retainer ring. Such systems are commonly used to protect against an aerosol.

(5) **Color Coding.** By federal regulation, each type of respirator cartridge/canister is color coded to identify its

intended use. The color coding may be achieved by coloring all or part of the cartridge/canister case or by affixing a colored label. See reference B6-5 for specific information on color coding.

(6) **Labeling.** Each cartridge/canister is labeled with the contaminant(s) it protects against and the NIOSH approval number. Some labels may provide more information about the cartridge's capabilities and limitations.

(7) **Military gas masks** (e.g., MCU-2A/P, Mark V, M40) are military-unique air-purifying respirators that are only to be used for chemical-biological-radiological (CBR) warfare. MILITARY GAS MASKS MUST NEVER BE USED IN PLACE OF AN AIR-PURIFYING RESPIRATOR. This chapter does not apply to the use and maintenance of military gas masks.

b. Atmosphere-supplying respirators are used when the contaminant has no warning property (e.g., smell, taste, eye irritation or respiratory irritation), the contaminant's concentration is too high to use an air-purifying respirator, or the environment is immediately dangerous to life or health (IDLH). The two types are supplied-air (airline) respirators and self-contained breathing apparatuses.

(1) Supplied-air respirators are further subdivided into hose mask and air-line respirators.

(a) Hose mask respirators consist of a facepiece, breathing tube, harness, and large-diameter, thick-wall, non-kinking, air-supply hose. A blower, either motor or hand driven, may supply the air, or the user, unaided, may simply draw the air into the hose with each breath. This respirator offers no advantages over the air-line respirator and is being removed from the fleet and must not be worn.

(b) Air-line respirators consist of a facepiece, hood, helmet, or suit; breathing tube; regulator; and small-diameter hose provided with some means to attach the hose to the user. A compressor, ambient air breathing apparatus (AABA), or compressed air cylinder(s) provides the air. The maximum length of hose allowed from a compressor or air fitting to the respirator shall be 300 feet unless a shorter maximum length is specified on the NIOSH approval. The NIOSH approval for each

air-line respirator applies to the combination of the respirator and air supply hose as a unit and specifically to the part numbers listed on the approval. Any use of another manufacturer's respirator or hose automatically invalidates the approval. Air-line respirators can be subdivided into three types as follows:

1. **Demand.** Available only with a facepiece, it supplies air to the user on demand (inhalation) which creates a negative pressure within the facepiece. Leakage into the face piece may occur if there is a poor seal between the respirator and the user's face. According to reference B6-5, demand respirators shall not be worn.

2. **Pressure Demand.** Available only with a facepiece, it maintains a continuous positive pressure within the facepiece, thus preventing contaminant leakage into the facepiece. Per reference B6-5, pressure demand respirators have higher assigned protection factors than continuous flow respirators.

3. **Continuous Flow.** Available with a facepiece, hood, helmet, or suit, it provides a continuous positive pressure and flow of air within any of the breathing zone containments, thus preventing contaminant leakage into the containment.

(2) Self-contained breathing apparatuses (SCBAs) consist of a facepiece, helmet, or hood; a breathing tube; and a source of air or oxygen, all of which is carried by the wearer. They may be subdivided into two categories.

(a) **Closed-circuit (rebreathing) SCBAs.** There are two types of this respirator. In both types carbon dioxide (CO_2) in the exhaled breath is removed by a chemical canister prior to rebreathing. The difference between the two is the source of oxygen. In one type, the oxygen is provided by either high-pressure gaseous oxygen or gaseous oxygen converted from liquid oxygen. In the other type, of which the Navy "oxygen breathing apparatus" (OBA) is an example, the water vapor in the exhaled breath reacts with a chemical in the canister to release oxygen. The OBA is not approved by NIOSH for commercial use, and its only authorized uses aboard ship are for damage control, fire-fighting operations, and fixed flooding systems PMS. Even

in emergencies, OBAs must not be used in flammable atmospheres due to the heat generated by the canister.

(b) **Open-circuit SCBAs.** In this type of SCBA, the exhaled air is expelled to the atmosphere and air is provided to the user from a compressed air cylinder. This type of respirator is available in either a demand (negative face piece pressure) or pressure-demand (positive facepiece pressure) model. Per reference B6-5, demand respirators shall not be worn.

(c) **Emergency Escape Breathing Device (EEBD).** This is a special type of SCBA developed for the Navy specifically for emergency escape from shipboard fires. They have a very short duration air supply. **THEY MUST NEVER BE USED FOR ENTRY INTO A HAZARDOUS ATMOSPHERE; THEY ARE FOR ESCAPE ONLY**!

This chapter does not apply to the use and maintenance of the EEBD.

(d) **Supplemental Emergency Escape Device (SEED).** This is another special type of SCBA developed for main propulsion space watchstanders ONLY. They have a very short duration air supply. **THEY MUST NEVER BE USED FOR ENTRY INTO A HAZARDOUS ATMOSPHERE; THEY ARE FOR ESCAPE ONLY**! This chapter does not apply to the use and maintenance of the SEED.

B0605. RESPIRATOR SELECTION

a. Approval. Previously, respirators were jointly approved by NIOSH and the Mine Safety and Health Administration (MSHA). On 8 June 1995, NIOSH updated the respirator certification procedures and reissued them under reference B6-6. NIOSH is now the sole certification agency. only certifies jointly with NIOSH if the respirator is being tested specifically for mine rescue. Both NIOSH approved and NIOSH/MSHA certified respirators are approved for use. NIOSH identifies approved respirators in the NIOSH certified equipment list, which is available electronically at the following website: http://www.cdc.gov/niosh/npptl/topics/respirators/CEL/default.html

If there is any doubt as to the respirator required to protect against a particular contaminant, consult an industrial hygienist.

b. Hazard Assessment. Determining the type of contaminant and its concentration is the most important consideration in the selection of respirators. This determination shall be provided as part of the most current industrial hygiene survey or by an industrial hygienist upon request. The industrial hygiene survey report shall identify and evaluate the respiratory hazard(s) in the workplace; this evaluation shall include a reasonable estimate of personnel exposures to respiratory hazard(s). Where the individual's exposure to respiratory hazard(s) cannot be identified or reasonably estimated by the industrial hygienist, the atmosphere shall be considered "Immediately Dangerous to Life or Health" (IDLH). The following are some chemical, physical and toxicological properties that should be considered in the selection of a respirator:

(1) Warning properties of the contaminant gas or vapor (e.g., smell, taste, eye irritation or respiratory irritation). Some contaminants lack sufficient warning properties to alert the wearer of respirator failure. Vapor- and gas-removing respirators are not approved for these contaminants, which include carbon monoxide, hydrogen cyanide, isocyanates and methyl alcohol.

(2) Whether the contaminant is absorbed through the skin.

(3) Whether any of the contaminants are immediately dangerous to life or health (IDLH) or whether injurious effects would be produced after prolonged exposure.

(4) Concentration of the contaminant in the atmosphere, the hazard ratio, maximum use concentration, and assigned protection factors (see paragraph B0606 and table B6-1).

(5) Occupational exposure limits (OELs) for the contaminant(s). See chapters B1 and B10 for standards for asbestos and lead, respectively.

(6) Whether an oxygen-deficient or oxygen-rich atmosphere exists or may be created.

(7) The nature, extent and frequency of the duties to be performed by personnel (e.g., welding or painting) in the work area.

(8) Degree of protection provided by the particular respirator.

B0606. LIMITATIONS OF RESPIRATORS

Paragraphs B0604 and B0605 mention some general limitations; however, the following provides more specific information:

a. Assigned Protection Factor (APF). The APF is the workplace level of respiratory protection that would be provided by a properly functioning and properly used respirator or a class of respirators when all elements of an effective respiratory protection program are established and are being enforced. Navy adopted APFs are provided in table B6-1. Although table B6-1 applies also to protection against asbestos and lead, refer to chapters B1 and for additional program requirements.

TABLE B6-1.-Assigned Protection Factors[4]

Type of respirator [1,2]	Quarter mask	Half mask	Full Face-piece	Helmet/ hood	Loose-fitting Face-piece
Air-Purifying Respirator	5	10	50	……	…….
Filtering Facepiece Resp.	5	……	……	……	…….
Powered Air-Purifying Respirator (PAPR).....	……	50	1000	[3]25/1000	25
Supplied-Air Respirator (SAR) or Airline Respirator					
Demand mode……	……	10	50	…….	…….
Continuous flow mode……	……	50	1000	[3]25/1000	25
Pressure-demand or other positive-pressure mode	……	50	1000	…….	…….
Self-Contained Breathing Apparatus (SCBA)					
Demand mode……	……	10	50	50	…….
Pressure-demand or other positive-pressure mode	……	……	10,000	10,000	……

(e.g., open/ closed circuit)					

[1] RPMs may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.
[2] The assigned protection factors in table 1 are only effective when the employer implements a continuing, effective respirator program as required by 29 CFR 1910.134, including training, fit testing, maintenance, and use requirements.
[3] The RPM must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a workplace protection factor or simulated workplace protection factor study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25. For further guidance see reference B6-5
[4] These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, RPMs must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

b. Oxygen-deficient Atmospheres. All air-purifying respirators require that sufficient oxygen be present in the atmosphere where they will be used. Sufficient oxygen is defined as at least 19.5% oxygen for use at essentially sea level.

c. Hose Length/Configuration and Air Pressure Requirements for Air-line Respirators. The approval specifies the maximum length of air supply hose that may be used with each respirator and this is a function of the pressure of the supplied air.

NOTE:

The allowed hose length for supplied-air respirators is specified on the NIOSH approval certificate, but in no case shall the length exceed 300 feet maximum. Supplied-air respirators shall be operated at the conditions of pressure and hose length specified in the approval. Only those hoses supplied by the respirator manufacturer shall be used. Air-line couplings shall be incompatible with outlet couplings for other gas systems to prevent inadvertent servicing with non-respirable gases or oxygen.

d. Environmental Temperature Operating Ranges. Atmosphere-supplying respirators have specific temperature ranges for which they are approved. Consult the manufacturer's specifications before use in extreme temperatures.

e. Maximum Use Concentrations. The maximum use concentration (MUC) for a class of respirators determines the maximum level of protection that a class of respirators can provide against a contaminant. The MUC is calculated by multiplying the APF by the OEL. However, if the IDLH concentration is lower than the MUC, then the IDLH concentration takes precedence over the calculated MUC.

f. Hazard Ratio. Another useful calculation in respirator selection is the hazard ratio, which indicates the minimum APF required. Hazard ratio is calculated by dividing the exposure concentration by the OEL.

B0607. USE OF RESPIRATORS

a. Prior to using a respirator to perform work that requires respiratory protection, the following requirements shall be met:

(1) The user shall pass a fit-test with each type of respirator to be used per paragraph B0608.

(2) The user shall be trained per paragraph B0612.

(3) Wearing contact lenses in contaminated atmospheres with respiratory protection is permitted.

(4) Tight fitting respirators shall not be worn when conditions such as facial hair, facial scars, or prescription eyeglasses prevent a good respirator seal.

(5) Wearing SCBAs during shipboard firefighting or other emergencies, including shore training for these emergencies, is military-unique. Fit-testing and medical certifications are not required prior to wearing SCBAs for these scenarios.

b. User Seal Checks. Prior to each use, perform a positive and negative user seal check prior to each use.

(1) **Positive Pressure User Seal Check.** Place your palm or thumb over the exhalation valve and press lightly. Exhale gently. The respirator is properly sealed if no air leaks around the edges and a slight positive pressure is felt inside the facepiece.

(2) **Negative Pressure User Seal Check.** Place your palm(s) over the cartridge(s) or canister inlet. Inhale gently. The respirator is properly sealed if no air leaks around the edges and a slight negative pressure is felt inside the facepiece as it collapses slightly towards the face.

c. Warning Signs of Respirator Failure

(1) **Particulate Air-purifying Respirator.** When breathing difficulty is encountered with a particulate air-purifying respirator (increased resistance due to partial clogging), the filter(s) must be replaced. If the respirator is a filtering facepiece (e.g., disposable) respirator then the respirator must be discarded.

(2) **Vapor or Gas Air-purifying Respirator.** When using a vapor or gas air-purifying respirator, if the user notices any of the warning properties (e.g., odor, taste, eye irritation (with a full facepiece respirator)), or respiratory irritation, he/she should promptly leave the area and replace the cartridge or canister before returning.

(3) **Service Life of Air-purifying Respirator Filters, Canisters, and Cartridges.** Filters, canisters, and cartridges for air-purifying respirators are intended to be used until filter resistance precludes further use, or the chemical sorbent is expended as signaled by the detection of a specific warning property (e.g., odor, taste, and/or irritation).

(a) Change end-of-service-life indicator cartridges and canisters when indicated by the appropriate color change. End-of-service-life (ESLI) indicator cartridges and canisters that are located on the front of the cartridges must be worn belt mounted or chest mounted, respectively, so that the ESLI indicator can be seen. More recently developed ESLIs are located on the upper edges of cartridges so that they are visible to the respirator wearer while cartridges are worn on the facepiece.

(b) Air-purifying cartridges shall be replaced whenever the user can detect contaminant warning properties, such as, odor, taste, or irritation. Cartridges shall also be replaced if the user has difficulty inhaling air through the cartridge, which may indicate filter overloading. The RPM may impose time limitations for cartridge use not to exceed eight hours. When in doubt about the previous use of the respirator, replace the filter, canister, or cartridge.

(4) **Air-line Respirator.** Leave the area immediately when the compressor failure alarm is activated or if an air pressure drop is sensed.

(5) **Self-contained Breathing Apparatus.** Leave the area as soon as the air pressure alarm activates.

B0608. RESPIRATOR FIT TESTING

Each individual who is required to use a tight-fitting respirator shall be qualitatively or quantitatively fit tested before being issued a respirator and annually thereafter unless the user is to wear a SCBA. Per paragraph B0607(5), SCBAs are exempt from the requirement to fit test. When conditions, such as facial hair, can reasonably be expected to interfere with the proper fit of respiratory protective equipment, the user shall not be permitted to do work requiring a respirator. Personnel with facial hair that could interfere with face seal or valve function will not be fit tested because the length and condition of facial hair changes daily and would necessitate daily fit testing. For all ships, anyone trained to fit test via training detailed in paragraph B0612 can perform fit testing. Fit testing can also be obtained via the supporting tender, local Navy environmental and preventive medicine units (NEPMUs), the cognizant medical treatment facility (MTF), or other sources. Fit testing results will be documented and contain the following minimum elements:

Name, rate/rank, division, department.
Date of current PHA
Date of fit test and by whom.
Fit test medium (material used, e.g., Bitrex™ (denatonium benzoate solution), irritant smoke) and type of cartridge(s) or filter used in the test.
Make (brand), model, and size of respirator(s) fitted.

a. Qualitative Fit Testing. Qualitative fit testing may be performed using irritant smoke, isoamyl acetate (banana oil), saccharin mist, or the Bitrex™ method. Fit testing shall conform to the procedures in appendix B6-C.

b. Quantitative Fit Testing. To wear full face, negative pressure, air-purifying respirators in atmospheres up to their assigned protection factor of 50, personnel must be quantitatively fit tested and the respirator must achieve a fit factor of at least 500, which equates to a safety factor of 10. This type of fit testing can only be performed by, and shall be requested from, shore activities.

B0609. INSPECTION, CLEANING, STORAGE AND MAINTENANCE OF RESPIRATORS

To ensure adequate performance and proper sanitation, respirators shall be maintained as follows:

a. Inspections. All respirators shall be inspected routinely before and after each use. Emergency use respirators shall be inspected after each use and at least monthly. Emergency respirator inspection records must be maintained for the life of the respirator. SCBAs shall be inspected periodically to ensure proper function during an emergency response and after each use and at least monthly. Follow manufacturer's recommendations for respirator inspection. General inspection guidance to identify respirator deficiencies is listed below:

(1) **Head Straps or Head Harness**. Examine straps or harness for breaks, loss of elasticity, broken or malfunctioning buckles and attachments (full facepiece only), excessively worn serrations on the head harness which might permit slippage.

(2) **Facepiece**. Examine facepiece for excessive dirt; cracks, tears, holes, or distortion from improper storage; inflexibility (stretch and massage to restore flexibility); cracked or badly scratched lenses in full facepieces; incorrectly mounted full facepiece lens or broken or missing mounting clips; cracked or broken air-purifying element holder(s), badly worn threads, or missing gasket(s) (if required).

(3) **Inhalation and Exhalation Valves**. Examine exhalation valves for foreign material, such as detergent residue, dust particles, or human hair under the valve seat; cracks, tears, or distortion in the valve material; improper insertion of the valve body in the facepiece; cracks, breaks, or chips in the valve body, particularly in the sealing surface; missing or defective exhalation valve cover; improper installation of the valve in the valve body.

(4) **Cartridge, Canister, or Filter**. Incorrect cartridge, canister, or filter for the hazard; incorrect installation, loose connections, missing or worn gaskets, or cross-threading in holder; expired shelf-life date on cartridge or canister; evidence of prior use of sorbent cartridge or canister, indicated by absence of sealing material, tape, foil, etc., over inlet.

(5) **Corrugated Breathing Tubes**. Broken or missing end connectors; missing or loose hose clamps; deterioration, determined by stretching the tube and looking for cracks.

(6) **Harness of a Front- or Back-mounted Gas Mask**. Damage or wear to the canister holder which may prevent its being held securely in place; broken harness straps or fastening.

(7) **Hoods, Helmets, Blouses, or Full Suits.** Examine for rips and tears and seam integrity; examine the protective headgear, if required, for general condition, with emphasis on the suspension inside the headgear; examine the protective face shield, if any, for cracks or breaks or impaired vision due to rebounding abrasive particles; ensure the protective screen is intact and secured correctly over the face shield of abrasive blasting hoods and blouses.

(8) **Air Supply Systems.** Examine for integrity and good condition of the air supply lines and hoses, including attachments and end fittings; correct operation and condition of all regulators, valves, or other air-flow regulators.

b. Cleaning, Sanitizing, and Storage. Respirators shall be cleaned and sanitized according to manufacturer's instructions or as follows:

(1) Remove and discard all used cartridges and filters.

(2) Disassemble and hand wash the facepiece and parts in a warm water and mild dishwashing detergent solution. Strong cleaning agents can damage respirator parts. Temperatures above 43°C (110°F) and vigorous mechanical agitation shall be avoided. Solvents (e.g., paint removers) that can affect rubber and other parts, shall not be used. Ultrasonic or other suitable washers may be used per manufacturer's instructions.

(3) Sanitize the facepiece using one of the following methods:

(a) Immerse the facepiece for two minutes in a warm water (43° C or 110° F) solution of hypochlorite solution (approximately one milliliter of liquid laundry bleach to one liter of water); or

(b) Immerse the facepiece for two minutes in a warm water (43° C or 110° F) solution of iodine (add 0.8 milliliters of tincture of iodine to one liter of water); or

(c) Immerse the facepiece for two minutes in a warm water (43 °C or 110° F) solution of approved commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

(4) Rinse in clean warm water not to exceed a temperature above 43°C (110°F).

(5) Air-dry in a clean uncontaminated area in such a way as to prevent distortion of the facepiece. If drying cabinets are used, the drying temperature shall not exceed 43°C or 110°F.

(6) Reassemble and reinspect respirator. If replacement parts are necessary, they shall be obtained and installed or the respirator shall be removed from service until the unserviceable parts are replaced. If parts are not available and cannot be replaced, discard the entire facepiece as it cannot be used without all parts in place. Interchanging of parts is prohibited.

(7) Place respirator in a clean plastic bag or other container and seal. Zip-lock plastic bags are preferred. Ensure the respirator is completely dry before sealing to prevent mildew.

(8) Store flat in a clean, dry, uncontaminated area without crowding which may distort the respirator facepiece.

c. Repair and Maintenance

(1) Personnel shall not service/repair any respirators for which they have not been specifically trained.

(2) No work shall be performed on reducing valves, regulators or alarms of atmosphere-supplying respirators (e.g., air-line respirators and SCBAs). These items shall be returned to the manufacturer for all repairs and adjustments.

B0610. ENTRY INTO IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH) ATMOSPHERES

a. Respirators. Should it become necessary to enter an IDLH atmosphere, only the following two types of respirators shall be used:

(1) A full facepiece, pressure-demand self-contained breathing apparatus (SCBA).

(2) A full facepiece pressure demand air-line respirator equipped with an auxiliary self-contained air supply having a minimum rated service life of 15 minutes. The self-contained air supply of 15 minutes must be sufficient to ensure escape from the IDLH area. These may only be used to enter an IDLH atmosphere when connected to the supplied air (airline) source. The auxiliary self-contained air supply may only be used for egress purposes. If the self-contained air supply (15-minute supply) is insufficient to ensure escape, then a SCBA with a minimum service life of 30 minutes must be used.

NOTE:

Although specified by reference B6-7, the equipment required in paragraphs B0610a(1) and (2) is not on the allowance lists of many ships. If the respirators

required are not carried aboard ship, an oxygen breathing apparatus (OBA) may be used for entry into atmospheres which are or are potentially IDLH when all of the following three conditions are met: underway, required by an emergency or for operational readiness reasons, and approved by the commanding officer. For situations which are not an emergency or operational readiness, entry shall be delayed until the ship returns to port and the entry may be made by an activity which has proper respiratory protection equipment. The above requirements do not apply to use of an OBA for damage control or firefighting.

b. Standby Personnel. At least one trained standby person, with a suitable respirator per paragraph B0610a, shall be present in the nearest uncontaminated area. If the standby person enters the IDLH atmosphere, there shall be a second standby person with a suitable respirator in the uncontaminated area.

c. Communications. The standby person and those persons working in the IDLH atmosphere shall be able to communicate continuously with each other (i.e., visually, by telephone or radio or signal line).

d. Rescue Equipment. Persons who enter any IDLH atmosphere shall also be equipped with safety harnesses and lines that can be used to rescue them should they lose consciousness. A hoist shall be present for removing personnel from the IDLH atmosphere. For more information on rescue operations and gas free engineering, refer to chapter B8.

CAUTION

Tanks, voids, compartments and other confined spaces may contain atmospheres that are hazardous to life or health. This may be due to the presence of flammable or toxic air contaminants or the absence of sufficient oxygen to sustain life. No one shall be permitted to enter any such area until tests of the atmosphere are completed by a qualified gas free engineer and entry by personnel is authorized by competent authority.

CAUTION

Educators located in remote spaces, if activated, can remove all breathing air. Ensure sufficient make-up air is provided and the space has adequate oxygen prior to entry in all educator-equipped remote spaces.

B0611. BREATHING AIR REQUIREMENTS

a. Air Quality. Breathing air or the air output of pumps or compressors which are sources of breathing air for air-line respirators or SCBAs shall meet at least the minimum requirements for Grade-D breathing air per references B6-1 B6-8 and B6-11. For SCBAs on submarines, the breathing air shall meet the minimum requirements of reference B6-11.

b. Ship's Low Pressure (LP) Air Compressors. Ship's LP air is not suitable for use as breathing air unless specifically tested and certified to meet the purity standards in paragraph B0611.a.

c. Ambient Air Breathing Apparatus (AABA). Air intakes for portable pumps such as the AABA shall be placed in an area free of contaminants. Periodic testing of the air quality from an AABA is not required. AABAs shall not be used for entry into IDLH atmospheres.

d. Frequency of Testing. The air output of compressors used by breathing air shall be tested quarterly. Quarterly testing of breathing air does not apply to the Navy's diving program or AABAs. Reference B6-9 addresses diving air requirements.

e. Carbon Monoxide or High Temperature Alarms for Breathing Air Compressors Containing Oil. Ships shall equip compressor systems with either high-temperature or carbon monoxide monitor and alarm systems or both, to control carbon monoxide levels. High-temperature cut-off switches on fixed compressors, which shut down the compressor at a temperature below which the lubricating oil breaks down (i.e., thermal degradation point), meet the requirement for high-temperature alarms, provided that quarterly monitoring meets the requirements for Grade-D breathing air. Ships shall equip all new and/or upgraded FIXED breathing air compressor systems with

high-temperature cut-off switches. New and/or upgraded PORTABLE breathing air compressor systems will be equipped or operated with carbon monoxide monitor and alarm systems during SCBA air cylinder charging operations. Calibrate monitor and alarm systems on compressors used for supplying breathing air according to the manufacturer's instructions.

B0612. RESPIRATORY PROTECTION TRAINING

a. Proper respirator training is essential for personnel required to wear respirators and for supervisors of those wearing respirators. Documented training shall be given prior to respirator use and annually thereafter, and shall include the following topics:

(1) Proper fitting and wearing of the respirator, including how to perform user seal checks. Each person shall demonstrate the capability to don and wear each type of respirator to be worn in the performance of normal and emergency duties including situations in which the respirator malfunctions.

(2) Respirator capabilities and limitations.

(3) Why the respirator is necessary, including the nature and degree of respiratory hazards and how improper fit, usage, or maintenance can compromise the protective effect of the respirator

(4) Proper respirator selection according to intended use.

(5) Respirator care, cleaning, maintenance, inspection, and storage.

(6) Prohibition against facial hair.

(7) How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.

(8) Wearing of spectacles, corrective glasses, face shields, goggles or other eye and face protection equipment shall not interfere with the seal of the facepiece to the face.

(9) Wearing of contact lenses in contaminated atmospheres is permitted.

(10) The general requirements of this chapter.

b. RPM's shall attend the Respiratory Protection Program Management Course (CIN A-493-0072) available from NAVOSHENVTRACEN.

c. Personnel assigned to issue respiratory protective equipment shall be trained on respirator selection, and care and maintenance prior to assignment and annually thereafter. The facility RPM should give the training.

d. See chapter A5 for training aids to assist in respiratory protection training.

B0613. MEDICAL EVALUATIONS

a. Military personnel, who have been confirmed by the MDR as having no deployment limiting medical conditions, and with a current annual PHA per reference B6-3 are considered qualified to wear any type of respiratory protection. Shipboard personnel undergoing shore firefighting training are not required to obtain medical qualification or respirator fit testing for self-contained breathing apparatuses (SCBA), including the oxygen breathing apparatus (OBA), prior to reporting for training.

Special evaluations shall be performed after prolonged absences from work for medical reasons or whenever a potential respirator-related medical problem has been identified.

b. In cases where individual medical readiness (IMR) status is not known, a formal respirator certification using the medical matrix examination #716 in reference B6-10 should be performed as in the past. In these cases, the following medical care providers can perform examination #716: a physician or a registered/occupational health nurse, physician's assistant, preventive medicine technician (NEC 8432), or a hospital corpsman (independent duty technician NEC 8425, or submarine medical technician (NEC 8402) only) under the supervision of a physician may conduct the medical evaluation.

B0614. SUBMARINE RESPIRATORY PROTECTION

a. Respiratory protection program requirements are only applicable to submarine operations in port. When respiratory protection is required at sea, the installed emergency air breathing (EAB) system is the primary protection. Nuclear system welders may use metal fume respirators with their welding goggles.

b. Submarine squadrons or naval submarine support commands (NSSCs) activities shall serve as the respiratory protection manager (RPM) activities for the submarines assigned. NSSC or squadron commander shall designate a RPM to provide support to all submarine units under their cognizance. Submarines shall designate an individual to serve as the respiratory protection assistant (RPA) for that unit.

c. Submarine respiratory protection programs shall comply with the following requirements:

(1) Proper respirator training is essential for personnel required to wear respirators and for supervisors of those wearing respirators. Required training shall be given and documented prior to respirator use and annually thereafter, and shall include the following topics:

(a) Proper fitting and wearing of the respirator, including how to perform user seal checks. Each person shall demonstrate their capability to don and doff each type of respirator to be worn in the performance of normal and emergency duties including situations in which the respirator malfunctions.

(b) Respirator capabilities and limitations including respirator and cartridge service life and warning signs of respirator failure.

(c) Nature and degree of respiratory hazards and the effects from exposure to the hazardous atmosphere.

(d) Proper respirator selection according to intended use.

(e) Respirator care, cleaning, maintenance and storage.

(f) Prohibition against facial hair.

(g) How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.

(h) Wearing of corrective glasses, goggles or other eye and face protection shall not interfere with the seal of the facepiece to the face.

(i) Wearing of contact lenses in contaminated atmospheres is permitted.

d. Respiratory protection managers (RPM) at submarine squadrons or NSSCs shall attend Respiratory Protection Program Management (RPPM) course (CIN A-493-0072). Courses are available from the Navy Occupational Safety and Health and Environmental Training Center (NAVOSHENVTRACEN).

(1) Personnel assigned to issue respiratory protective equipment shall be trained on respirator selection, and care and maintenance prior to assignment and annually thereafter. The training should be given by the facility RPM.

(2) Submarine personnel assigned as the RPA shall be trained by the NSSC or squadron designated RPM. Training shall include local guidance and program standard operating procedures, respirator selection, care and maintenance, fit-testing procedures, and respirator user training. Training shall be conducted upon initial assignment and annually thereafter.

(3) See chapter A5 for training aids to assist in respiratory protection training. Department heads, division officers, leading petty officers, and the MDR shall be trained annually on the recognition of work requiring respirators, respiratory protection procedures, and the proper use of respirators.

e. Responsibilities

(1) Per paragraph B0614(b), **NSSC or squadron commanders** shall designate a RPM to provide support to all submarine units under their cognizance.

(2) **The RPM shall:**

(a) Ensure that up-to-date command guidance exists on respiratory protection. Such guidance will normally be issued in this chapter; however, information unique to the command may be written into a command directive.

(b) Develop and maintain a roster of personnel enrolled in the respiratory protection program.

(c) For respirators needed while underway (e.g., nuclear welders), provide guidance to submarine RPAs and supply officers on the selection of proper types and stock levels of respiratory protective equipment. Sufficient respirators, spare parts, and expendable supplies (e.g., cartridges and filters) shall be stocked to conduct all operations."

(d) Ensure respirator users and supervisors of those wearing respirators are trained on respiratory protection requirements. This training shall be repeated annually.

(e) Ensure appropriate fit testing is performed for all respirator users. Fit testing may be conducted by squadron/NSSC RPM, submarine RPA, supporting intermediate maintenance activity (IMA), or other sources. Fit testing results will be documented and contain the following minimum elements:

1. Name, rate/rank, division, department.

2. Date of current periodic military physical and/or preventive health assessment.

3. Date of fit-test and by whom.

4. Fit-test medium (material used (e.g., Bitrex, irritant smoke)) and type of cartridge(s) or filter used in the test.

5. Make (brand), model, and size of respirator(s) fitted.

(f) Provide the supporting submarine intermediate maintenance activity (IMA) or central respirator

issue/control point an electronic copy of respirator fit test results to contain as a minimum:

1. Name.

2. Last respirator training date.

3. Date medically qualified.

4. Respirator successfully fit tested (brand, model, size).

5. Name of fit tester/date/command.

(g) Coordinate with the supporting submarine IMA to determine what respirators (brand, model, and size) are available for issue.

(h) Train submarine RPAs initially upon assignment and annually thereafter. Training shall include local guidance and program standard operating procedures, respirator selection, care and maintenance, fit testing procedures, and respirator user training procedures.

(i) Provide submarine RPAs with a copy of the local guidance or standard operating procedures, roster of personnel in the respiratory protection program, standard submarine respiratory protection lesson plan for training, and sufficient supplies to conduct fit testing and training.

(j) Provide submarine RPAs with a letter verifying training by the RPM.

(k) Evaluate the overall program annually and evaluate compliance of each submarine unit at least once during each in port availability period to include a review of procedures, fit testing and training conducted by appointed RPAs. A checklist for program evaluation is provided in appendix B6-A.

(l) Ensure a baseline or periodic industrial hygiene survey (IH) has been conducted of all processes and areas where there is the risk of occupational exposure to air contaminates. The IH survey will provide recommendations on the

types of respiratory protection required for various processes, areas, and situations.

(m) Coordinate with the submarine IMA, squadrons and NSSC to establish a central respirator issue/control point for issuing, maintaining, and storing respirators.

(n) Ensure respirators are inspected, cleaned, disinfected, maintained, and stored per paragraph B0609.

(3) **Submarine commanding officers** shall appoint at least one RPA (for two-crew submarines, each crew shall have at least one RPA).

(4) **The RPA** shall:

(a) Assist the NSSC/squadron RPM in the management of the program for his submarine.

(b) Maintain a copy of the local guidance or standard operating procedures, roster of personnel in the respiratory protection program, standard submarine respiratory protection lesson plan for training, and sufficient supplies to conduct fit testing and training.

(c) Ensure respirator users and supervisors of those wearing respirators are trained on respiratory protection requirements. This training shall be repeated annually.

(d) Ensure appropriate fit-testing is performed for all respirator users. Recordkeeping for fit-testing shall include type of respirator, brand name and model, method of test, test results, test date, name of the instructor/tester, and name of the individual tested.

(e) Provide command guidance for work processes that may require use of respiratory protection, as identified in the industrial hygiene survey.

(f) Issue respirators to personnel requiring respiratory protection.

(5) **Division officers shall:**

(a) Ensure that personnel have a current fit test and training prior to donning a respirator.

(b) For respirators needed while in port, ensure personnel obtain required respirator from the supporting submarine IMA, NSSC, or squadron.

(c) Ensure non-disposable respirators are returned to supporting submarine IMA when work is completed and prior to getting underway.

(d) Provide respirators needed while underway (e.g., nuclear systems welders).

(6) **The MDR shall:**

(a) Confirm that personnel, who are issued respirators have no deployment limiting medical conditions, and have a current annual PHA per reference B6-3 (see paragraph B0613).

(b) Assist the RPM and/or RPA in identifying and evaluating hazards and selecting appropriate respirators, as recommended in the industrial hygiene survey.

(7) **Supporting submarine IMAs shall:**

(a) Upon request, schedule/provide initial or refresher fit-testing and training for the submarine respirator users while in port.

(b) Upon request establish a respirator central control point and provide only the respirators needed by submarines in port. Respirators will only be issued to personnel with respirator user cards described in paragraph B0614e(2)(f).

(c) Provide a standard submarine respiratory protection lesson plan to RPMs and submarine RPAs for use in training their crews.

(8) **Personnel required to wear a respirator to perform in-port work shall:**

(a) Wear the provided respirator when required and in a proper manner.

(b) Inspect the respirator before and after each use per paragraph B0609a.

(c) Perform a positive and negative respirator facepiece seal check prior to each use per paragraph B0607b.

(d) Report any malfunction of the respirator to their immediate supervisor and the RPA.

(e) Prevent damage or loss of respiratory protective equipment.

f. Procedures

(1) Personnel shall report to the RPA or RPM for fit-testing and training. Those personnel who do not have a current (within one year) record of fit-testing/training shall be fit-tested and trained by the RPA, RPM or submarine supporting IMA

(2) All personnel shall receive the following training prior to respirator issue from the respirator issuing facility:

(a) Respirator inspection procedures.

(b) Positive and negative facepiece seal checks.

(c) Respirator/cartridge service life.

(d) Warning signs of respirator failure.

Respirators/cartridges shall be issued for the duration of the job.

(3) Upon completion of work, disposable respirators shall be disposed of; non-disposable respirators shall be returned to the supplying activity.

g. Training. Department heads, division officers, leading petty officers, and the MDR shall be trained annually on the recognition of work requiring respirators, respiratory protection procedures, and the proper use of respirators.

CHAPTER B6

REFERENCES

B6-1. 29 CFR 1910.134 Respiratory Protection http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=12716

B6-2. NAVSEA S9213-33-MMA-000/V, Radiological Controls for Ships

B6-3. OPNAVINST 6120.3

B6-4. OPNAVINST 5100.23G

B6-5. NEHC Technical Manual, NEHC-TM6290.91-2, Industrial Hygiene Field Operations Manual, chapter 9, Respiratory Protection, http://www-nehc.med.navy.mil/downloads/ih/ihfom/IHFOM_CH9.pdf

B6-6. 42 CFR 84, Approval of Respiratory Protection Devices

B6-7. Naval Ships Technical Manual (NSTM) 074, Volume 3, Gas Free Engineering

B6-8. Compressed Gas Association, Inc., Commodity Specification for Air, Pamphlet G-7.1-2004 (NOTAL)

B6-9. OPNAVINST 3150.27B

B6-10. NEHC Technical Manual OM 6260, Occupational Medical Surveillance Procedures Manual and Medical Matrix http://www-nehc.med.navy.mil/occmed/Matrix.htm.

B6-11. NAVSEA S9510-AB-ATM-010(U), Nuclear Powered Submarine Atmosphere Control Manual

Appendix B6-A

Respirator Program Checklist

Program Element	Yes	No	N/A
Is a respiratory protection manager (RPM) appointed in writing by the commanding officer? (paragraph B0602(a)			
Has the RPM completed the required training described in paragraphs B0602(b)(1) and B0612(b)?			
Has a baseline or periodic industrial hygiene survey been conducted of all processes and areas where there is the risk of occupational exposure to air contaminants? (paragraph B0602(b)(2))			
Does the industrial hygiene survey provide recommendations on the types of respiratory protection required for various processes, areas, and situations? (paragraph B0602(b)(2))			
Are there a sufficient supply of NIOSH or NIOSH approved respirators, spare parts, and expendable supplies (e.g., cartridges and filters) maintained to conduct routine and emergency operations? (paragraph B0602(b)(3))			
Are there a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the users? (paragraph B0602(b)(3))			
Is a current roster of personnel enrolled in respiratory protection maintained and provided to the medical department representative (paragraph B0602(b)(4))?			
Is fit testing performed initially and annually and documented per paragraph B0608? (paragraphs B0602(b)(5)and B0603(h)			
Are central control points established for issuing and maintaining respiratory protection equipment? (paragraph B0602(b)(6))			
Are divisions that frequently use respirators and personnel who are assigned individual respirators allowed to maintain custody of their own respiratory protection equipment and are responsible for its proper case and storage? (paragraph B0602(b)(6))			

Program Element	Yes	No	N/A
Are respirators inspected, cleaned, disinfected, stored, maintained and repaired per paragraph B0609? (paragraph B0602(b)(7))			
Is the respirator program evaluated at least annually by the RPM using this checklist (paragraph B0602(b)(9)) and evaluated by the industrial hygiene office performing baseline and periodic industrial hygiene surveys? (paragraph B0603(l))			
Has the medical department representative (MDR) confirmed that personnel, who are issued respirators have no deployment limiting medical conditions, and have a current annual Preventive Health Assessment per OPNAVINST 6120.3 and paragraph B0613? (paragraph B0602(d)(1))			
Does the MDR assist the RPM in identifying and evaluating hazards and selecting appropriate respirators, as recommended in the industrial hygiene survey? (paragraph B0602(d)(2))?			
Do respirator issuers issue respirators only to personnel who are trained, medically certified per paragraph B0613, and successfully fit-tested for the respirator(s) requested? (paragraph B0602(e))			
Are respirator issuers trained initially and annually by the facility RPM on respirator selection, care and maintenance? (paragraph B0612(c))			
Do all hands inspect their respirator before and after each use; perform user seal checks, prevent damage to or loss of respirators; and report any malfunction of the respirator to their immediate supervisor? (paragraph B0602(f))			
Are there written standard operating procedures (SOPs) governing the selection, care, issue, and use of respirators, including worksite SOPs? (paragraph B0603(c))			
Are only NIOSH approved respirators selected and issued? (paragraph B0603(d))			
Are only hoses supplied by the respirator manufacturer as part of the complete supplied-air assemblage used? (paragraph B0606(c))			

Program Element	Yes	No	N/A
Are air-line couplings incompatible with outlet couplings for other gas systems to prevent inadvertent servicing with non-respirable gases or oxygen? (paragraph B0606(c))			
Are tight fitting respirators not allowed to be worn when conditions such as facial hair, facial scars, or prescription eyeglasses prevent a good respirator seal? (paragraph B0607(a)(4))			
Are particulate filters changed or filtering facepiece respirators discarded when breathing resistance is first noticed? (paragraph B0607(c)(1))			
Are emergency use respirators inspected after each use and at least monthly and are inspection records maintained for the life of the respirator (paragraph B0609(a))?			
Are only SCBA or combination airline/SCBA allowed for entry into IDLH atmospheres? (paragraph B0610(a)(2))			
During entry into IDLH atmospheres, is at least one trained standby person, with a suitable respirator per paragraph B0610a, present in the nearest uncontaminated area? If the standby person enters the IDLH atmosphere, is there a second standby person with a suitable respirator in the uncontaminated area? (paragraph B0610(b))			
During entry into IDLH atmospheres, is the standby person and those persons working in the IDLH atmosphere able to communicate continuously with each other, i.e., visually, by telephone or radio or signal line? (paragraph B0610(c))			
Are personnel entering into IDLH atmospheres also equipped with safety harnesses and lines that can be used to rescue them should they lose consciousness? (paragraph B0610(d))			
Is a hoist present for removing personnel from the IDLH atmosphere? (paragraph B0610(d))?			

Program Element	Yes	No	N/A
Is entry into tanks, voids, compartments and other confined spaces prohibited until tests of the atmosphere are completed by a qualified gas free engineer and entry by personnel is authorized by competent authority? (paragraph B0610(d))			
Are breathing air sources tested quarterly to ensure they meet Grade D air quality requirements of paragraph B0611? (paragraphs B0602(b)(8) and B0611(d))			
Is ship's low pressure air prohibited from use as breathing air unless specifically tested and certified to meet the purity standards in paragraph B0611(a). (paragraph B0611(b))?			
Are air intakes for portable pumps such as the AABA placed in an area free of contaminants? (paragraph B0611(c))			
Are fixed air compressor systems equipped with high-temperature cut-off switches, which shut down the compressor at a temperature below which the lubricating oil breaks down (i.e., thermal degradation point) and do these compressors meet quarterly requirements for Grade D breathing air? (paragraph B0611(e)			
New and/or upgraded fixed breathing air compressor systems equipped with high-temperature cut-off switches? (paragraph B0611(e)			
New and/or upgraded portable breathing air compressor systems equipped or operated with carbon monoxide monitor and alarm systems during SCBA air cylinder charging operations? (paragraph B0611(e)			
Are monitor and alarm systems on compressors used for supplying breathing air calibrated according to the manufacturer’s instructions? (paragraph B0611(e)			
Are respirator wearers trained initially and annually per paragraph B0612?			

Appendix B6-B
TYPES OF RESPIRATORS

Filtering Facepiece

Half-mask

Full face

Airline/SCBA

SCBA

EEBD

Appendix B6-C

Qualitative Respirator Fit Test Protocols

1. Fit Testing Procedures - General Requirements

The tester shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA- accepted fit test methods, both qualitative fit test (QLFT) and quantitative fit test (QNFT).

a. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

b. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

c. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

d. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

e. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item I.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

f. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

(1) Position of the mask on the nose,

(2) Room for eye protection,

(3) Room to talk,

(4) Position of mask on face and cheeks.

g. The following criteria shall be used to help determine the adequacy of the respirator fit:

(1) Chin properly placed;

(2) Adequate strap tension, not overly tightened;

(3) Fit across nose bridge;

(4) Respirator of proper size to span distance from nose to chin;

(5) Tendency of respirator to slip;

(6) Self-observation in mirror to evaluate fit and respirator position.

h. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in paragraph B0607 or those recommended by the respirator manufacturer which provides equivalent protection to the procedures in paragraph B0607. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

i. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which

cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

j. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

k. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

l. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least five minutes before the start of the fit test.

m. The fit-test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

n. Test Exercises: The following test exercises are to be performed for all fit-testing methods prescribed in this appendix. The test subject shall perform exercises, in the test environment, in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

> When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

(6) Grimace. The test subject shall grimace by smiling or frowning. (**This applies only to QNFT testing; it is not performed for QLFT.**)

(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

(8) Normal breathing. Same as exercise (1).

(9) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

2. Isoamyl Acetate (IAA) Fit Test

Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

Odor Threshold Screening

Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

a. Three 1 liter glass jars with metal lids are required.

b. Odor-free water (e.g., distilled or spring water) at approximately 25 degrees C (77 degrees F) shall be used for the solutions.

c. The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a one liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

d. The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

e. The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

f. A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

g. The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

h. The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2):

"The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

i. The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

j. If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

k. If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

3. IAA Fit-Test

a. The fit-test chamber shall be a clear 55-gallon drum liner suspended inverted over a two-foot diameter frame so that the top of the chamber is about six inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

b. Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

c. After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

d. A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

e. Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampoule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

f. Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate the exercises in paragraph I.14.

g. If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

h. If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test (paragraph II.(a)), select and put on another respirator, return to the test area and again begin the fit test procedure described in paragraphs II.b.(1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least five minutes before retesting. Odor sensitivity will usually have returned by this time.

i. If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

j. When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person

conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

4. Saccharin Solution Aérosol Protocol. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

a. Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4 inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

Note:

If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

(4) Using a DeVilbiss Model 40 inhalation medication nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting one ml of the fit test solution (see paragraph III(b)(5) below) in 100 ml of distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the 10 squeezes, the screening test is completed. The taste threshold is noted as 10 regardless of the number of squeezes actually completed.

(8) If the first response is negative, 10 more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second 10 squeezes, the screening test is completed. The taste threshold is noted as 20 regardless of the number of squeezes actually completed.

(9) If the second response is negative, 10 more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of 10 squeezes, the screening test is completed. The taste threshold is noted as 30 regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately one ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

b. **Saccharin solution aerosol fit test procedure**

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure described in IIIb.1 above.

(3) The test subject shall don the enclosure while wearing the respirator selected in paragraph I of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in paragraph I.14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit-test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

5. Bitrex TM (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test (QLFT) Protocol. The Bitrex TM (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

a. **Taste Threshold Screening.** The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

(1) During threshold screening as well as during fit-testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

(2) The test enclosure shall have a 3/4 inch (1.9 cm) hole in front of the test subject’s nose and mouth area to accommodate the nebulizer nozzle.

(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste.

(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

(5) The threshold check solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

(7) An initial 10 squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the 10 squeezes, the screening test is completed. The taste threshold is noted as 10 regardless of the number of squeezes actually completed.

(8) If the first response is negative, 10 more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second 10 squeezes, the screening test is completed. The taste threshold is noted as 20 regardless of the number of squeezes actually completed.

(9) If the second response is negative, 10 more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of 10 squeezes, the screening test is completed. The taste threshold is noted as 30 regardless of the number of squeezes actually completed.

(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

(13) Correct use of the nebulizer means that approximately one ml of liquid is used at a time in the nebulizer body.

(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

b. **Bitrex Solution Aerosol Fit Test Procedure**.

(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

(2) The fit test uses the same enclosure as that described in paragraph IV.a.(1) above.

(3) The test subject shall don the enclosure while wearing the respirator selected according to paragraph I of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

(5) The fit-test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

(6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of

squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in paragraph I.14. of this appendix.

(9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

(11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

6. Irritant Smoke (Stannic Chloride) Protocol. This qualitative fit-test uses a person's response to the irritating chemicals released in the smoke produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

a. General Requirements and Precautions

(1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

(2) Only stannic chloride smoke tubes shall be used for this protocol.

(3) No form of test enclosure or hood for the test subject shall be used.

(4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine

whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

(5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

b. **Sensitivity Screening Check.** The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject’s direction to determine that he/she can detect it.

c. **Irritant Smoke Fit Test Procedure**

(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

(2) The test subject shall be instructed to keep his/her eyes closed.

(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test

subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

(5) The exercises identified in paragraph I.14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

(8) If a response is produced during this second sensitivity check, then the fit test is passed.

CHAPTER B7

ELECTRICAL SAFETY

B0701. DISCUSSION

This chapter provides guidance to assist in the identification of electrical hazards, and to prevent mishaps that could cause injuries and extensive damage to shipboard equipment and may compromise the ship's mission capabilities. Reference B7-1, chapter 300 is the primary reference for detailed technical guidance on electrical hazards and the potential for electric shock. Work involving electric tools, equipment and systems is inherently dangerous. Always use the principles of operational risk management (ORM) when dealing with electricity. Details of ORM are found in reference B7-2.

B0702. RESPONSIBILITIES

a. The commanding officer shall authorize all work on energized equipment per reference B7-1.

b. The safety officer shall ensure electrical/electronic indoctrination training is provided for all newly reporting personnel per paragraph B0708. Coordinate with the electrical officer/electronics material officer to provide this training.

c. The electrical safety officer/electronic maintenance officer shall:

(1) Establish an electrical tool issue room per paragraph B0707.

(2) Ensure that applicable maintenance and repair are conducted per reference B7-3.

(3) Ensure that the on board cardiopulmonary resuscitation (CPR) instructor is certified per paragraph B0708.

(4) Ensure that all electrical tools/equipment received on board are authorized for shipboard use. Reference B7-1 contains guidance on determining suitability for shipboard use.

(5) Complete training per paragraph B0708d.

d. The supply officer shall ensure that all electrical tools/equipment received on board are turned over to the electrical safety office (electrical division for submarines) for a safety inspection prior to issue.

e. Division officers shall:

(1) Ensure that assigned personnel are trained per paragraph B0708.

(2) Ensure that all portable electrical equipment is visually inspected prior to use, and is electrically safety checked according to applicable planned maintenance system (PMS). Reference B7-1 (paragraph 300-2.7) contains detailed technical guidance on portable electric equipment.

(3) Ensure that all personal electrical/electronic equipment is authorized for shipboard use. Reference B7-1 contains guidance on determining suitability for shipboard use. The electrical safety checks for personal electrical/electronic equipment are not required.

(4) Ensure that required personnel receive CPR training per paragraph B0708.

(5) Ensure that items open purchased or received from Navy supply are authorized for shipboard use and electrically safety checked prior to use. Reference B7-1 contains guidance on determining suitability for shipboard use.

(6) Ensure that all personnel experiencing electrical shock report to medical.

f. All hands shall:

(1) Request permission from their division officer prior to bringing personal electrical/electronic equipment aboard. This requirement does not apply to battery-operated

equipment incapable of being plugged into ships' electrical service.

(2) Report any condition, equipment or material that is believed to be unsafe.

(3) Report any electrical shock to their division officer.

(4) Not make any alterations or additions to the ship's electrical system (e.g., adding an electrical receptacle in a berth to use a CD player).

B0703. ELECTRICAL SAFETY ELEMENTS

a. Working on de-energized equipment. (paragraph B0704)

b. Working on energized equipment. (paragraph B0705)

c. Personal protective equipment(PPE). (paragraph B0706)

d. Portable electrical tool issue. (paragraph B0707)

e. General precautions for portable electrical equipment. (chapters C9 and D5)

f. Training. (paragraph B0708)

g. Safety standards implementation. (chapters C9 and D5 list the electrical safety standards)

B0704. WORKING ON DE-ENERGIZED EQUIPMENT

Completely de-energizing equipment will ensure safety from electrical hazards. Opening the power supply circuit breaker or switch and/or removing the fuses should de-energize electrical equipment. Some equipment has more than one source of power that requires opening multiple breakers or switches and/or removing multiple fuses. Tag-out the circuit breaker switches and fuses. Check the equipment with a voltmeter to ensure that it is completely de-energized before maintenance begins.

a. For technical requirements concerning work on de-energized equipment, see reference B7-1, paragraph 300-2.4.

b. For tag-out procedures, see reference B7-3.

B0705. WORKING ON ENERGIZED EQUIPMENT

a. Approval Procedures. As stated in reference B7-1, paragraph 300-2.5.1, do not disassemble or maintain energized electrical equipment without approval of such action by the commanding officer, or in his/her absence, the command duty officer (CDO). Exceptions to this policy are those cases where approved instructions issued by higher authority (equipment technical manuals, planned maintenance system (PMS), or an established troubleshooting procedure) permit opening or inspecting equipment in the course of performing maintenance, routine testing, taking measurements, or making adjustments that require equipment to be energized. Commanding officer permission is not required when checking equipment or circuits to verify de-energization.

b. Energized Circuit Working Procedures. Reference B7-1, paragraph 300-2.5.2 contains technical procedures for working on energized equipment.

c. Damaged or deranged equipment shall be considered energized.

B0706. PERSONAL PROTECTIVE EQUIPMENT (PPE)

a. Use only gloves marked with a colored label indicating the usage limitations. Reference B7-1, table 300-2-1 contains further information on stock numbers, maximum safe voltage usage, and label colors.

b. Stow rubber insulating gloves in the box in which they came. Perform PMS on the gloves prior to stowage. Stow other rubber electrical safety protection equipment in a clean, dry, oil-free location. Take care not to fold the gloves, as folding will frequently result in cracks that will greatly reduce insulating capability of the material. Do not use electrical safety gloves for cleaning or chemical handling. For further information on glove damage causes, inspection, and maintenance refer to reference B7-1, paragraph 300-2.5.3.

B0707. PORTABLE ELECTRICAL TOOL ISSUE (Not applicable to submarines)

a. Surface ships shall establish a centralized portable electrical tool issue room for issue of portable electrical tools. Larger ships may have more than one tool issue room.

b. Personnel assigned to issue portable electric tools shall perform visual inspections and quarterly safety testing of equipment per reference B7-1 (paragraph 300-2.7.5) prior to issue to personnel. Reference B7-1 (paragraph 300-2.7) contains additional technical guidance on portable electric equipment.

c. Prior to issue of portable electric tools, the personnel assigned to issue tools shall brief the tool users on general precautions for portable electrical equipment per B0708, as well as issue any required personal protective equipment.

d. Certain divisions or work-centers (those that contain electrical/ electronic ratings) may retain selected electrical tools or equipment in their permanent custody. These divisions will perform safety checks on their equipment at the required frequency. These divisions shall not issue portable electrical tools to other divisions or work-centers.

e. Housekeeping items such as vacuum cleaners and floor buffers need not be retained in the electrical tool issue room.

f. Unsafe electrical tools should be clearly marked out-of-commission "OOC", be rendered incapable of being energized, and be kept in locked storage separate from the other tools. The only exceptions should be for those tools in which immediate repair is to be accomplished.

B0708. TRAINING

a. All personnel, when reporting aboard, shall receive indoctrination on basic electrical safety, including the requirements regarding use of personal protective equipment. Reference B7-1 may be used as a source of training material. The training shall also include recognizing symptoms of electrical shock, electrical shock trauma, and emergency first aid responder techniques.

b. Each ship shall have a certified American Red Cross/American Heart Association, or equivalent CPR instructor on board. At least 50% of all electrical/electronics associated ratings shall be certified in basic life support.

c. Personnel who man the portable electrical tool issue room shall complete the "Electrical Tool Issue Room," Watchstation 302 in the Safety Programs Afloat Personal Qualifications Standard (PQS), NAVEDTRA 43460-4A.

d. The electrical safety officer shall complete Watchstation 304 of the safety programs afloat PQS within 16 weeks of assignment.

CHAPTER B7

REFERENCES

B7-1. Naval Ships' Technical Manual (NSTM) chapters 300, 302, 310, 313, 320, 330 and 400

B7-2. OPNAVINST 3500.39B

B7-3. NAVSEA S0400-AD-URM-010/TUM Rev. 01, “Tag-out User’s Manual” (NOTAL)

CHAPTER B8

GAS FREE ENGINEERING

B0801. DISCUSSION

a. No routine hazard, with the exception of ordnance, is as dangerous as the presence of potentially lethal atmospheres in ship's spaces. In many instances, potentially harmful gases or vapors are present in such a low concentration (parts per million (ppm)) that no adverse conditions are created. By design a ship has many confined spaces (especially tanks and voids) in which a multitude of both toxic and non-toxic gas or vapor creating substances and operations are used in the normal operation of the ship. Hazardous atmospheres may be created that can explode or cause asphyxiation. Compounding the problem is that many gases or vapors are not detected by the human ability of smell, and personnel attempting to save a fallen shipmate may themselves be overcome and killed by undetected vapors. It is for these reasons that every confined space shall be considered hazardous and entry into or work in or on such spaces is prohibited until the space has been gas free tested by qualified gas free engineering personnel. This is known as gas free engineering (GFE).

b. Consult reference B8-1 for further details concerning specific procedures and related safety precautions during shipboard gas free evolutions. Reference B8-1 contains a program checklist which shall be used for annual program evaluation.

c. For maintenance periods pier-side, references B8-2 and B8-3 contain additional procedures and related safety precautions for conducting gas free operations.

B0802. PRECAUTIONS

a. All hands shall:

(1) Notify work-center supervisor prior to entering any unventilated, non-occupied space designated to store hazardous or toxic materials or any sealed space, verify that such a space was gas free tested and certified safe for entry and/or work by the appropriate gas free engineering personnel

prior to entry, and comply with the requirements of the gas free engineering certificates posted outside the space.

(2) Notify the work-center supervisor before any new space is used to store hazardous or toxic material or of any spill of hazardous or toxic material.

(3) When working in any confined space, always work with an observer or an attendant monitoring the work from outside the space. Maintain communication with personnel outside the space. The type and frequency of communication shall be specified by the GFE based on the nature of the space, the operation, and the degree of hazard.

b. Work-center supervisor shall notify chain of command and gas free engineer (GFE) to obtain approval:

(1) Prior to entering any unventilated, non-occupied space designated to store hazardous or toxic materials or any sealed space and

(2) Before any new space is used to store hazardous or toxic material or of any spill of hazardous or toxic material.

c. If a person is seen unconscious in any space, no one is to enter that space without appropriate respiratory protective equipment and a backup assistant.

B0803. GAS FREE ENGINEERING SUBSECTIONS

The following subsections apply to gas free engineering:

a. Confined space entry procedures, including testing. (reference B8-1, paragraphs 074-19.4 through 19.15)

b. Personal protective equipment. (reference B8-1, paragraphs 074-19.7 through 19.9)

c. Ventilation requirements. (reference B8-1, section 074-21)

d. Emergency and rescue procedures. (reference B8-1, section 074-25)

e. Instrumentation, including calibration and maintenance. (reference B8-1, appendices K and L)

f. Training of ship's force and gas free engineering personnel. (reference B8-1, paragraph 074-18.7 through 18.9)

CHAPTER B8

REFERENCES

B8-1. Naval Ships' Technical Manual, NAVSEA S9086-CH-STM-030/CH-074 V3, "Gas Free Engineering"

B8-2. NAVSEA S6470-AA-SAF-010, Gas free Engineering Manual (NOTAL)

B8-3. COMFLTFORCOMINST 4790.3, REV A, CH-4, Joint Fleet Maintenance Manual (JFMM), Volume 4, chapter 25

CHAPTER B9

RADIATION SAFETY

B0901. DISCUSSION

a. This chapter outlines Navy safety and occupational health policies and procedures designed for levels of command which comprise the naval afloat establishment to minimize personnel exposure to radiation from sources other than nuclear power systems and nuclear weapons that have their own radiation protection and control programs. This chapter also excludes those individuals, who as patients must undergo diagnostic or therapeutic procedures involving use of ionizing radiation.

b. Per paragraph A0103b, the Director, Naval Nuclear Propulsion Program (CNO (NOON))is responsible for the control of radiation and radioactivity associated with naval nuclear propulsion plants. As such, the requirements of this chapter do not apply to the naval nuclear propulsion program. Issues concerning radiation and radioactivity associated with naval nuclear propulsion plants should be addressed via the chain of command.

c. Radiation is commonly divided into two categories: ionizing and non-ionizing. Ionizing radiation has sufficient energy to strip electrons from atoms in the media through which it passes. Less energetic radiation that is incapable of electron stripping is termed non-ionizing radiation.

d. Ionizing radiation can be in the form of energetic particles (such as neutrons, betas, alphas, protons) or in the form of electromagnetic radiation (EMR). Ionizing radiation in the form of EMR, sometimes referred to as a photon, is conventionally referenced by its energy, with about 40 electron volts (eV) being the smallest amount of energy necessary to liberate an electron from an atom (i.e., ionize an atom). The production of ionizing radiation can occur in a variety of ways. For example, from the spontaneous decay of natural or man-made radioactive materials or from devices that directly produces EMR such as X-ray machines, or indirectly, such as from particle accelerators.

e. Some devices containing radioactive material, such as radioactive calibration source materials, may require a naval radioactive material permit (NRMP) to possess and use them. NRMPs are issued to Navy and Marine Corps commands by the Naval Radiation Safety Committee (NRSC), per references B9-1, B9-2, and B9-3. The NRSC is chaired by the Director, Environmental Readiness Division, Office of the Chief of Naval Operations (N45). Under the master materials license issued by the Nuclear Regulatory Commission (NRC) to the Naval Radiation Safety Committee, a NRMP is equivalent to a NRC license.

f. Non-ionizing radiation is energy that propagates through space in the form of electromagnetic waves but possesses insufficient energy to ionize the material through which it passes. Non-ionizing radiation comprises the lower energy portion of the EMR spectrum as shown in figure B9-1.

Figure B9-1: A Summary of the Electromagnetic Spectrum and Relationships of Wavelength (λ), Frequency (ν), and Energy (E).

			$\lambda \nu = C$				$E = h \nu$		Approximate Description	
			Wavelength		Frequency		Energy			
			λ		ν		E			
ELECTROMAGNETIC RADIATION	NON IONIZING	RF	∞	km	0	Hz	Direct Current	eV	Voltage = Current x Resistance	
			10,000	km	30	Hz	1.2E-13	eV	Radiowaves	
			100	mm	3	GHz	1.2E-05	eV		Radar (3 MHz - 300 GHz)
			100	mm	3	GHz	1.2E-05	eV	Microwaves	
			0.1	mm	3000	GHz	1.2E-02	eV		
		LASER	10,000	nm	3.0.E+04	GHz	0.1	eV	Infra-Red	
			700	nm	4.3E+05	GHz	1.8	eV	Visible	
			400	nm	7.5E+05	GHz	3.1	eV		
			180	nm	1.7E+06	GHz	6.9	eV	Ultra-violet	
	IONIZING		31	nm	9.6E+06	GHz	40	eV	Lowest Ionization Energy	
			0.06	nm	4.8E+09	GHz	20	keV	Mammography X-rays	
			2.5E-02	nm	1.2E+10	GHz	50	keV	Dental/Medical X-rays	
			4.1E-03	nm	7.2E+10	GHz	300	keV		
			1.9E-03	nm	1.6E+11	GHz	662	keV	Cs-137 Gamma Ray	
			9.9E-04	nm	3.0E+11	GHz	1.25	MeV	Co-60 Gamma Ray	
			1.2E-04	nm	2.4E+12	GHz	10	MeV	Cosmic Rays	

Note: "C" is the speed of light in a vacuum equal to 3 x 10^{8} meters per second. "h" is Planck's constant equal to 3.34 x 10^{-34} Joule seconds.

g. As shown in Figure B9-1, non-ionizing radiation can be further divided into two sub-categories: radio frequency radiation (RFR) and laser radiation.

h. RFR is conventionally referenced by its frequency and includes frequencies from approximately 0 hertz (Hz) to 3000 gigahertz (GHz). Communication transmitters, radars, and radio frequency heat sealers emit RFR.

Note:

A Hz equals 1 cycle per second.

i. Laser radiation is conventionally referenced by its wavelength and includes wavelengths from approximately 10^{4} nm (Infra-red) to 180 nm (Ultra-Violet). This includes the visible wavelengths between approximately 700 nm (red) to 400 nm (violet), with all the other colors in between these wavelengths (note the order - red, orange, yellow, green, blue, indigo, violet - pneumonic "ROY G. BIV").

Note:

nm is the abbreviation for nanometers. 1 nm equals 1 x $(10)^{-9}$ meters.

j. For all EMR (ionizing and non-ionizing), wavelength (λ) and frequency (ν) are related such that their product is equal to the speed of light in a vacuum (c), where c equals 3 x 10^{8} meters per second.

$$\lambda \nu = c$$

k. For all EMR (ionizing and non-ionizing), the energy is equal to product of Planck's constant (h) and the frequency (ν), where h equals 3.34 x 10^{-34} Joule seconds.

$$E = h \nu$$

l. Potentially hazardous sources of ionizing and non-ionizing radiation exist aboard Navy ships. Examples of ionizing radiation sources include radioactive materials and x-

ray generating equipment. Examples of non-ionizing radiation sources include communication transmitters, radar systems, radio frequency heat sealers, and lasers.

m. The mechanism for potential harmful biological effects from personnel exposure to ionizing radiation involves the possibility of directly ionizing cellular DNA (deoxyribonucleic acid) or other cellular materials (such as cytoplasm) that result in the production of reactive oxidizing agents that can potentially affect cell function. There are four possible outcomes if this occurs; the cell can repair itself (majority of the time), the cell can be damaged and unable to reproduce, the cell can be damaged and reproduces corrupt daughter cells, or the cell dies. The occupational ionizing radiation control levels imposed by the Navy are typically 10 times lower than the Federal limits and keep worker exposures as low as reasonably achievable (ALARA). While any exposure, no matter how small, involves some risk, the risk is small compared with normal hazards of life. For further information and a perspective about the risks associated with occupational exposure to ionizing radiation see appendix M of reference B9-4.

n. The mechanism for potential harmful biological effects for radio frequency (RF) non-ionizing radiation depends on the frequency and magnitude of exposure. Predominant mechanisms for potential harmful biological effects as a function of frequency are; (0 to 1 Hz) magnetohydrodynamic effects (forces on flowing blood and other body fluids potentially stressing circulatory systems), (1 Hz to 5 MHz) electrostimulation (potentially causing involuntary muscle contraction thereby potentially causing falls), (100 kHz to 300 GHz) tissue heating (with potential thermal damage; for deep tissues between 100 kHz and 3 GHz and surface heating (skin) between 3 GHz and 300 GHz). The Navy adopts radio frequency (RF) radiation controlled maximum permissible exposure (MPE) limits that are consistent with non-governmental consensus-based standards (reference B9-5 for 0 kHz to 3 kHz and reference B9-6 for 3 kHz to 300 GHz).

Note:

Reference B9-7 is under revision to reflect the current MPE limits listed in references B9-5 and B9-6.) The RF exposure limits for controlled environments represent scientifically derived values to limit absorption of RF

energy in the body, and to restrict the magnitude of RF currents induced in the body. This means that the amount of energy absorbed is insufficient to produce or cause adverse effects on health, even under repeated or long-term exposure conditions. The Navy also establishes maximum levels to prevent hazards from electromagnetic radiation to fuels (HERF) and hazards from electromagnetic radiation to ordnance (HERO).

o. The mechanism for potential harmful biological effects for laser (non-ionizing radiation) is excessive energy deposition to parts of the eyes or to the skin leading to tissue damage. For laser exposures that are within the MPE limits, no adverse biological effects are expected to occur even under repeated or long-term exposure conditions. The Navy adopts laser MPE limits that are consistent with non-governmental consensus-based standards (see references B9-8 and B9-9). Laser incidents are rare due to rigorous Navy laser safety and training programs.

B0902. RESPONSIBILITIES

a. Ionizing Radiation:

(1) **The Commanding Officer shall:**

(a) Appoint a radiation safety officer (RSO) for industrial uses of radiation, when required, and ensure that they are properly trained per reference B9-1.

(b) As applicable, ensure compliance with the requirements of references B9-10, B9-11, B9-12, B9-13, B9-1, B9-2, and naval radioactive material permits (NRMPs) specifically issued to the command, and the applicable NRMPs (issued to another command) when possessing the devices noted in paragraph B0903a.(2).

(2) **The Radiation Safety Officer shall:**

(a) Establish, implement, and maintain an effective radiation safety program per reference B9-1and NRMPs specifically issued to the command.

(b) Ensure that the appropriate communication processes are established to provide direct access to the highest levels of the chain of command to provide program status reports, notification of major evolutions, non-conformance issues, or any concern that may impact safety, readiness, or mission objectives.

b. Non-Ionizing Radiation (RF):

(1) **The Commanding Officer shall**:

(a) Request a radiation hazard (RADHAZ) survey when:

1. Emitter systems have been added, relocated, or upgraded as a result of scheduled ship alteration (SHIPALT) or alteration (ALT) installation since the last RADHAZ survey.

2. Watch stations or work areas are moved or established in the proximity of emitter systems.

3. Gasoline storage or transfer stations are relocated in the proximity of emitter systems.

4. Personnel are injured as a result of exposure to RF radiation and the command requires assistance in re-evaluating the current RADHAZ survey.

5. The current RADHAZ survey was conducted prior to 1995.

(b) Submit a confirmation letter to COMNAVSEASYSCOM (Code SEA 05K2B), stating that the recommended control measures provided in the hazards of electromagnetic radiation to personnel (HERP) survey report have been implemented to obtain a NAVSEASYSCOM letter of certification, per reference B9-14.

(c) Ensure personnel are trained to be familiar with potential RF exposure hazards and appropriate protective measures.

(2) **Division Officers (responsible for work-centers and areas with identified radiation hazards) shall:**

(a) Ensure RF radiation hazard areas are posted with

the appropriate warning signs and deck markings in accordance with appendix B9-A.

(b) Ensure that awareness and hazard recognition training is given for all personnel assigned to work or stand duty in RADHAZ areas to prevent exceeding MPE limits.

(c) Investigate, document, and report all suspected RF incidents or mishaps involving suspected RF overexposures to personnel exposure in accordance with the governing references listed in paragraph B0903.

c. Non-Ionizing Radiation (Lasers):

(1) **The Commanding Officer shall:**

(a) For the use of any class of military exempt lasers or the use of commercial class 3b or commercial class 4 lasers, establish a laser safety program per references B9-15 and B9-16 and designate a laser system safety officer (LSSO) to manage the program.

(b) Ensure the LSSO is properly trained and qualified per references B915 and B9-16.

(c) Ensure other personnel are trained to be familiar with potential laser exposure hazards and appropriate protective measures.

(2) **Division Officers (responsible for work-centers and areas with identified radiation hazards) shall:**

(a) Ensure that the LSSO has posted laser hazard areas with the appropriate warning signs in accordance with appendix B9-A.

(b) Investigate, document, and report all suspected Laser incidents or mishaps involving suspected Laser overexposures to personnel exposure in accordance with the governing references listed in paragraph B0903.

(3) **Laser System Safety Officer (LSSO) shall:**

(a) Establish, implement, and maintain an effective

laser safety program per reference B9-15 and B9-16.

(b) Ensure that the appropriate communication processes are established to provide direct access to the highest levels of the chain of command to provide program status reports, non-conformance issues, or any concern that may impact safety, readiness, or mission objectives.

(c) The LSSO is responsible for labeling lasers and posting laser hazard areas.

B0903. GUIDANCE

a. Ionizing Radiation

(1) **Industrial Radiography.** Sources of ionizing radiation are used onboard tenders, in shipyards, and at intermediate maintenance activities for non-destructive testing (NDT) of materials. A NRMP specifically issued to the command is required to possess and use radiographic devices containing radioactive material. X-ray machines are used on carriers, large amphibious assault ships, and at naval air stations for NDT procedures conducted on aircraft. Each command performing industrial radiography must have a formal radiation safety program instruction. The ship's radiological safety officer (RSO) is responsible for all aspects of the program described in the governing instructions.

(2) **Radioactive Material Under a NRMP Issued to Another Command**

(a) Devices used to detect chemical warfare agents, explosives, and radioactive material (RADIACs) may contain small amounts of radioactive material. These devices are regulated by NRMPs (issued to other commands) that allow ships to use and possess them under specific conditions including inventory requirements, leak testing, and other control procedures. Each command possessing one of these devices must have a copy of the applicable NRMP that describes in greater detail the conditions for possession. To get a copy of the applicable NRMP, contact NAVSEADET RASO.

(b) Depleted uranium is used as penetrators in some munitions. Ships are authorized to possess these munitions

under a NRMP issued to NSWC Crane. Each command possessing depleted uranium munitions must comply with the procedures outlined in the NRMP. Contact NAVSEADET RASO to obtain a copy of the NRMP.

(c) The laser target designator used on the FA-14 and FA-18 aircraft and the in-flight blade inflation system (IBIS) used on some helicopters contain radioactive material under NRMPs issued to Naval Air Systems Command. Squadrons possessing these devices must comply with the procedures outlined in the NRMP. Contact NAVSEADET RASO to obtain a copy of the NRMP.

(3) **Other Radioactive Material**

(a) Luminous markers, clocks, smoke detectors, compasses, depth gauges, and electron tubes may contain small quantities of radioactive material. The evaluation of such items shall consist of a simple inspection for physical damage. Reports of damaged devices should be made to NAVSEADET RASO.

(b) Some aircraft and missile construction material contains magnesium-thorium alloys. Altering this material through cutting or grinding by ship crewmembers is prohibited. Only commands specifically authorized by a NRMP may alter these materials per reference B9-1. Thorium containing welding rods are exempt from radioactive material permitting.

Note:

The small quantities, low specific activity, and physical form of radioactive materials used aboard ships usually make them non-hazardous. However, breakage and spread of even small quantities of some radioactive materials can lead to internal contamination (by ingestion, inhalation or wound contamination) in excess of allowable limits. Therefore, report all incidents of suspected or actual contamination through the cognizant medical department representative (MDR) per reference B9-10 and notify NAVSEADET RASO of any such incidents.

(4) **Medical Radiography**. Medical x-ray units (fixed or mobile) ashore and on hospital ships are evaluated annually.

All other fixed x-ray units afloat require 24-month evaluation. Deployed units may delay unit evaluation until returning to homeport if meeting the 24-month window would interfere with operational obligations. Dental fixed and portable x-ray units require 36-month evaluation. All radiation protection surveys shall be conducted by a qualified Navy medical radiological surveyor in accordance with the Navy Radiological Systems Performance Evaluation Manual (Reference B9-12). The medical officer shall request the survey from the nearest medical activity with a RHO or contact the Navy Environmental Health Center (NAVENVIRHLTHCEN), Radiation Health Team.

(5) **Governing Instructions**

(a) Industrial: NAVSEA S0420-AA-RAD-010 (reference B9-1)

(b) Medical/Dental:

1. NAVMED P-5055 (reference B9-10)

2. BUMEDINST 6470.22 (reference B9-11)

(6) **Points of Contact**

(a) Industrial: NAVSEADET Radiological Affairs Support Office (RASO), P.O. Drawer 260, Naval Weapons Station, Yorktown, VA 23691-0260; Commercial: (757) 887-4692 DSN: 953-4692 FAX: (757) 887-3235

(b) Medical/Dental: Radiation Health Team, Navy Environmental Health Center (NAVENVIRHLTHCEN), 620 John Paul Jones Circle, Suite 1100, Portsmouth, VA 23708-2103 DSN: 377-0766. Commercial: (757) 953-0766. Fax: (757) 953-0685.

b. Non-Ionizing Radiation Radiofrequency (RF) and Microwaves (MW)

(1) **Radar, communication equipment (transmitters), and radiofrequency (RF) heat sealers**

(a) These devices may emit hazardous levels of RF radiation. In addition to causing biological changes,

RF/microwave radiation can induce electrical currents/voltages that may cause shocks and burns, premature activation of electro-explosive devices (EEDs) in ordnance, and arcs, which may ignite flammable materials. Information on the hazards of RF (electromagnetic) radiation to personnel, fuels, and ordnance is available in reference B9-17. Hazards of electromagnetic radiation to fuels (HERF) and for ordnance (HERO) can be found in volume II of reference B9-17. The hazards of electromagnetic radiation to personnel (HERP) can be found in Volume I of reference B9-17. However, volume I of reference B9-17 will be amended to reflect the current RF MPE limits listed in reference B9-5 for 0 kHz to 3 kHz and reference B9-6 for 3 kHz to 300 GHz. (Note: reference B9-7 is also under revision to reflect the current MPE limits listed in references B9-5 and B9-6). Refer to appendix B9-A for a discussion of controlled and uncontrolled MPE limits.

(b) Commander, Naval Sea Systems Command (COMNAVSEASYSCOM) is the lead agent for coordinating electro-magnetic safety programs for naval ships. Commander, Space and Naval Warfare Systems Command (COMSPAWARSYSCOM) is the lead agent for coordinating electromagnetic safety programs for shore facilities.

(c) Commands shall determine RF levels for all areas in which personnel could receive exposures in excess of the exposure limits. Commands must use proper RF measurement techniques and application of the RF exposure limits to avoid imposing unnecessary restrictions on operations or establishing overly restrictive protective boundaries.

(d) A comprehensive RF hazard evaluation for major platforms, such as warships or communication stations, where multiple RF emitters exist in close proximity to each other, requires considerable technical familiarity with electromagnetic fields. Such surveys may involve determination of boundary locations for protective fences or enclosures, or specifying operational conditions or restrictions necessary for protection of personnel, (see points of contacts (POCs) below for activities that perform these evaluations, which are primarily an engineering-type survey).

(e) Following a survey and implementation of the recommended control measure provided in the HERP survey report

of B9-14, submit a confirmation letter to COMNAVSEASYSCOM (Code SEA 05K2B) requesting a NAVSEASYSCOM letter of certification (POC information below).

(f) Activities shall provide RF safety training to personnel who routinely work directly with RF equipment or whose work environments contain RF equipment that routinely emits RF levels in excess of the exposure limits for controlled environments. Activities shall conduct training before assignment to such work areas, and shall focus on awareness of the potential hazards of RF fields, established procedures and restrictions to control RF exposures, and personnel responsibility to limit their own exposures. Activities may incorporate RF safety training in periodic safety training programs to satisfy command-training objectives.

(g) The Navy does not authorize RF-shielded protective clothing for routine use as a means of protecting personnel. This does not preclude use of other protective equipment, such as electrically insulated gloves and shoes for protection against electrical shock or RF burn, or for insulation from the ground plane.

(h) Electric and magnetic fields exist around power lines, electrical devices and appliances. The intensity of these fields decreases rapidly with distance. While questions have been raised about the possibility of health effects from exposure to electric and magnetic fields at levels that are commonly encountered in homes and most work places, findings issued by various scientific review panels have not confirmed that such fields pose a risk to health.

(i) Since the body is a conductor, time varying magnetic fields, or body movement in a static magnetic field, induce electric fields and current flow inside the body. For commonly encountered fields near high voltage transmission lines, power distribution systems, office equipment, and household appliances, the magnitude of these induced currents will typically be below levels which are perceptible. Existing guidelines given in reference B9-5 have been established to limit induced current densities in body tissues. This rationale has been used to set a biological endpoint since no other definable risk criterion has been identified for establishing a health standard for electric and magnetic fields.

(2) **Governing Instructions**

(a) MPE Limits - see references B9-5 (0 kHz to 3 kHz) and B9-6 (3 kHz to 300 GHz).

(b) Training and reporting requirements - see reference B9-7.

(c) HERP, HERF, HERO operational guidance - see reference B9-17.

(d) Electromagnetic environmental effects - see reference B9-18.

(e) Medical management of non-ionizing casualties - see reference B9-19.

(f) Institute of Electrical and Electronics Engineers (IEEE) C95 Series of Standards, Guides, and Recommendations - see references B9-5, B9-6, B9-20 thru B9-23.

(3) **Points of Contact**

(a) For Technical Assistance and Reporting Authority. Naval Sea Systems Command (SEA 62), Commander, Naval Sea Systems Command Headquarters, Washington, D.C., 20362, commercial: 202-781-3140.

(b) For measurement surveys ad technical assistance for shipboard RF emitting systems. Systems Electromagnetic Effects Branch (Code J-52), Naval Surface Warfare Center Dahlgren Division, 17320 Dahlgren Road, Dahlgren, VA 22448-5100, DSN 249-8594, commercial 540-653-3487, or 401-832-5552, fax 540-653-7494.

(c) For RF bio-effects and medical research issues, or assistance in evaluating personnel overexposure incidents. Naval Health Research Center-Detachment Directed Energy Bioeffects Laboratory, Brooks City Base, 8315 Navy Road, Brooks City Base TX 78235-5365, DSN 240-4699/6532, commercial 210-536-4699/6532, fax: 210-536-6439.

(d) For RF health hazards, personnel exposures and exposure incidents from industrial and medical RF emitting sources. Navy Environmental Health Center (NEHC), 620 John Paul Jones Circle, Suite 1100, Portsmouth, VA 23708-2103 DSN: 377-0766. Commercial: (757) 953-0766. FAX: (757) 953-0685.

(e) For guidance on RF exposure limits and health issues. Non-Ionizing Radiation Health Branch, Bureau of Medicine and Surgery (Code M342), 2300 E Street NW, Washington DC 20372-5300, DSN 762-3448/3444, commercial 202-762-3448/3444, fax 202-762-0931.

(f) For site certification and measurement surveys for shore-based RF emitting systems. Space and Naval Warfare Systems Center (SPAWARSYSCEN) Charleston (Attn: Code 323), P.O. Box 190022, North Charleston, SC 29419-9022, DSN 588-4228, or commercial 843-218-4228. For shore facilities within PACNAVFACENGCOM geographical region, contact Space and Naval Warfare Systems Activity Pacific (SPAWARSYSACT PAC) (Attn: Code 2915), 675 Lehua Avenue, Pearl City, HI 96782-3356, DSN 315-474-7330, commercial 808-474-7330, fax: 808-474-5511.

c. Non-Ionizing Radiation. Lasers (class IIIb, class IV, and Military Exempt Lasers Only).

(1) **Laser range finders, laser guided munitions, communications equipment, fiber optics, scoring systems, landing systems and training aids**.

(a) The Navy has adopted a system for categorizing the hazards of lasers, which provides a practical means for determining safety requirements appropriate for different types of lasers. These categories range from a class I laser that is safe to view under all conditions, to the class IV laser which can cause eye damage under most viewing conditions. Appendix B9-A provides information on laser classification, types of laser warning signs and labels.

(b) For most lasers used in medical, laboratory, research and industrial applications, the use of the classification system precludes the necessity for performing any laser measurements or calculations. Reference B9-24 requires manufacturers to classify and label their laser systems. Laser measurements or laser safety calculations will usually be

required only for lasers operating on outdoor ranges or in open areas when it is necessary to define a laser nominal hazard zone (NHZ).

(c) Lasers or laser systems designated for combat, combat training or classified in the interest of national security may be exempted from compliance with some or all of the provisions of reference B9-24. To obtain military exemption status, the contractor must have written authorization from the military contracting activity, and the laser product must be certified to conform with requirements in reference B9-15, B9-25, and have been approved by the Navy Laser Safety Review Board (LSRB).

(d) Military laser systems are reviewed by the LSRB during their development to ensure that adequate safety criteria have been incorporated. LSRB review is required at appropriate stages of development and prior to introduction of prototype or production units into the fleet for testing or initial use. An important function of the Navy laser safety program is a determination of the nominal ocular hazard distance (NOHD) or safe viewing range, for each operational laser system used in the Navy. LSRB review also applies to class IIIb and class IV commercial lasers and laser systems that are not intended solely for laboratory or medical use. Reference B9-15 contains general guidance for materials necessary and procedures followed by the LSRB review.

(e) Commands shall maintain a current inventory of all military exempt lasers, class IIIb lasers, and class IV lasers for submission to the administrative lead agent (ALA) (BUMED Code M342) as requested. Commands wishing to dispose of lasers shall obtain approval from BUMED following guidance in references B9-15 and B9-25.

(f) Commands operating class IIIb or class IV commercial or military exempt lasers shall establish a laser safety program and designate a laser system safety officer (LSSO) per reference B9-15. The laser safety program shall include an inventory of all commercial class IIIb, class IV and all classes of military exempt lasers that are assigned to the command lasers for submission to the administrative lead agent as requested.

NOTE:

Some commercially available laser pointers are categorized as class IIIa lasers with output levels that are not considered safe for all viewing conditions. A formal laser safety program is not required for class IIIa laser pointers; however, the user needs to recognize that care must be exercised to control its accessibility (kept out of the hands of children or others who are unaware of the hazardous nature of lasers), and to avoid directing the pointer at those in the audience. Class II laser pointers do not pose a hazard during normal viewing, and their use is not restricted.

(g) Laser MPE limits are published in reference B9-8. For laser exposures that are within the MPE limit, no adverse biological effects are expected to occur even under repeated or long-term exposure conditions. Only trained and technically qualified personnel shall apply these exposure limits in determining laser safe viewing conditions, since an improperly conducted laser hazard evaluation may pose serious risks to a person's eyes.

(h) Laser exposure limits are set to protect tissue from damage and are not the equivalent of comfortable viewing levels. Operators of lasers need to be aware of secondary laser safety concerns. For example, intrabeam viewing of visible wavelength lasers, even at or below the permitted safe level, will still be perceived as an intense light source capable of producing disabling glare or visual after-images. These temporary visual effects can interfere with performing critical tasks such as operating vehicles or aircraft. Similarly, intrabeam viewing of lasers at or below the permitted exposure limits can still damage or “saturate” night vision viewing devices because of the high amplification of incident light levels provided by the devices. Wearing of laser protective eyewear can also lead to other safety concerns, such as the potential for blocking or filtering out the color of some warning or alarm indicator lights.

(i) Commands shall provide laser system safety officer (LSSO) laser safety training through the completion of a course approved by ALA (BUMED-M342) and the Lead Navy Technical Laboratory at the Naval Surface Warfare Center, Dahlgren Division. There are four categories of LSSOs, administrative

laser safety officer (ALSO), technical laser safety officer (TLSO), laser safety specialist (LSS), and range laser safety specialist (RLSS). Re-testing at the LSSO's highest certification level is required to maintain certification for all categories of LSSO every 4 years. If the LSSO fails the re-certification examination, the LSSO will have to be re-certified by attending the appropriate course. Commanding officers should determine which category of LSSO is appropriate for their command considering their mission, types of lasers being used, and size of the laser safety program. Laser safety-training requirements at medical treatment facilities for the medical LSSO and designated medical personnel are contained in reference B9-16.

(j) Laser range safety officers, laser maintenance personnel and industrial laser supervisors shall complete a formal command laser safety training course as outlined in reference B9-15. Commands shall provide formal classroom training on the potential hazards associated with accidental exposure to laser radiation to all personnel in areas operating class IIIb (and class IIIa with danger logo) or class IV lasers. In particular, the vulnerability of the eyes to being damaged by lasers shall be emphasized. Commands shall conduct annual refresher training per reference B9-15. For employee training, the following laser safety training videotapes are available from the Norfolk Regional Electronic Media Center: Laser Hazards and Control, 804245DN, Hazards and Control of Military Lasers, 804246DN, and Laser Safety in Medical Treatment Facilities, 803198DN.

(k) Specific laser safety-training requirements at medical treatment facilities for the medical LSSO and designated medical personnel are contained in reference B9-16.

(l) Broadband optical sources such as germicidal lamps, phototherapy, sun lamps, backlights, arc lights, projector lamps, high intensity discharge lamps and infrared arrays are also used in many medical and industrial applications. These types of light sources may require controls to prevent possible acute effects such as skin burns, photokeratitis, cataracts or retinal burns. Exposure guidance can be found in the American Council of Government Industrial Hygienists - Threshold Limit Values and Biological Exposure Indices (www.acgih.org/). Obtain assistance in the evaluation of broadband optical sources, where personnel

are considered to be at ocular risk, from an industrial hygienist or radiation health officer.

(2) **Governing Instructions**

(a) Policy and guidance in the identification and control of laser radiation hazards - see reference B9-15.

(b) Laser safety for medical facilities - see reference B9-16.

(c) Military exempt lasers - see reference B9-25.

(d) Laser safety on ranges and in other outdoor areas - see reference B9-26.

(e) Food and Drug Administration (FDA) performance standards for light emitting products - see reference B9-27.

(f) American National Standards Institute (ANSI) Z136 series of standards, guides, and recommendations - see references B9-8, B9-9, and B9-27 thru B9-31.

(g) Medical management of non-ionizing casualties - see reference B9-19.

(3) **Points of Contact**

(a) **For medical and industrial laser operations.** Bureau of Medicine and Surgery (BUMED) (Code M342), 2300 E Street NW, Washington, DC 20372-5300, DSN: 762-3448. Commercial: 202-762-3448. Fax: 202-762-0931.

(b) **For all laser operations; other than medical, military exemption of lasers, and certification surveys of laser firing ranges.** (Funding for services shall be provided by the requesting command). Laser System Evaluation and Range Surveys: Naval Surface Warfare Center Dahlgren Division, G-72, 17320 Dahlgren RD Dahlgren, VA 22448, DSN: 249-1060/1149/2442, Commercial 540-653-1060/1149/2442, Fax: 540-653-8824 http://www.navylasersafety.com/

(c) **Laser Range Surveys**. Naval Surface Warfare Center Corona Division (Code SE-41), 2300 Fifth St, Norco, CA 92860 mailing address P.O. Box 5000 Corona, CA 92878-5000, DSN: 933-4090, Commercial: 909-273-4090 or Fax: 909-273-5089.

(d) **For laser bio-effects and medical research issues, or assistance in evaluating laser-induced injuries**. Naval Health Research Center-Detachment Energy Bioeffects Laboratory, Brooks City Base 8315 Navy Road, Brooks AFB, TX 78235-5365, DSN: 240-4699/6552, Commercial: (210) 536-4699/6552, Fax:(210) 536-6439.

(e) **For guidance on laser exposure limits and health issues**. Non-Ionizing Radiation Health Branch, Bureau of Medicine and Surgery (Code M342), 2300 E Street NW, Washington DC 20372-5300, DSN: 762-3448/3444, Commercial: 202-762-3448/3444, Fax: 202-762-0931.

B0904. RADIATION HAZARD AREAS

a. Ionizing Radiation. Ionizing radiation hazard signs are required at access points to radioactive material storage areas and where the radiation levels could exceed the exposure limit for the general public. The type and wording of each sign is dependent upon the type of radiation area. Reference B9-11, provides specific guidance for posting ionizing radiation hazard areas. Medical X-ray units will be posted per reference B9-13 and B9-4.

b. Radiofrequency Radiation (RFR) Hazard Areas. RFR hazard warning signs are required at all access points to areas where the RFR levels may exceed the MPE. Obtain NAVSEA-approved warning signs and labels through the standard stock system (see appendix B9-A). When military operational considerations prevent the posting of such signs, a waiver must be obtained from cognizant safety and occupational health professionals depending upon the RFR source. Where the RFR levels may exceed 10 times the MPE limit, additional warning devices and controls such as flashing lights, audible signals, barriers, and interlocks may be required, depending on the potential risk for exposure. These areas will be noted in the ship's RADHAZ and baseline industrial hygiene survey reports.

(1) **Radar and Communications.** The ship's RADHAZ report provides detailed posting and deck marking information for radar

and communications RFR hazard areas. These are also described in appendix B9-A.

(2) **Heat Sealers and Other RFR Sources.** The baseline industrial hygiene survey will provide posting requirements for other RFR hazard areas.

c. Lasers (Class IIIb, Class IV, and all Military Exempt Lasers). The LSSO is responsible for labeling lasers and posting laser hazard areas. See appendix B9-A.

B0905. MEDICAL SURVEILLANCE

The baseline industrial hygiene survey identifies those work-centers that require medical surveillance for exposure to radiation.

a. Ionizing Radiation. Medical surveillance of personnel exposed to ionizing radiation shall follow reference B9-13.

b. RF Radiation

(1) Workers who have implanted medical devices such as pacemakers or defibrillators or use certain medical devices such as apnea monitors or electrically powered wheelchairs should be aware of the potential for interference from various emitters of RF energy. This condition is called radiofrequency interference (RFI) or electromagnetic interference (EMI). The consequences of these potential failures range from inconvenience to serious injuries and death.

(2) It is impossible to state that there will be no observable effects for all devices. This is because electronic devices can be extremely sensitive to EMI and there are no regulatory standards by the Food and Drug Administration (FDA) or the Federal Communications Commission (FCC) forcing manufacturers to harden their products against EMI. Therefore the Navy cannot make any guarantees that all medical or consumer electronic devices won't experience EMI, even at RF levels well below the MPE limits for biological effects.

(3) Therefore, it is each worker's responsibility to discuss with their physician the EMI risks associated with each medical device that they may be using and determine if they are

able to work within the RF environment of their command. It is also the worker's responsibility to inform their chain of command of any medical devices they may be using and to discuss any safety concerns they may have with those devices.

c. Lasers

(1) Enrollment in a laser radiation medical surveillance program is limited to those personnel who are clearly at risk from exposure to laser radiation. The nature of such risks is associated with accidental injuries resulting from excessive exposure to laser levels and not as a result of chronic exposures. The command LSSO determines which personnel should be enrolled in the surveillance program using the following guidance:

(a) Laser workers requiring medical surveillance are those individuals who routinely work with class IIIb or class IV lasers under conditions where there is a likely potential for accidental exposures to excessive levels. These workers require a pre-placement and termination laser eye examination per reference B9-15.

(b) The following personnel generally require medical surveillance: (1) Research and development (R&D) and laboratory personnel who routinely work with unenclosed class III and class IV laser beams. (2) Maintenance personnel who routinely repair or align class III or class IV laser systems. (3) Operators (personnel behind the laser) and down-range personnel who routinely work with class III or class IV engineering laser transits, geodimeters and alignment laser devices. (4) Operators who routinely work with class IIIb and class IV industrial lasers where access to an unenclosed beam path is possible.

(c) Other laser workers or personnel where the potential for accidental exposure is deemed very unlikely generally do not require medical surveillance. For example: (1) Personnel who work with class I or class II lasers, or with laser systems containing class III or class IV lasers when there is little or no potential for exposure to the open laser beam. (2) Visitors or other personnel involved infrequently in laser testing, demonstrations or training when the LSSO has ensured such personnel will be protected from exposure to levels of laser radiation greater than the MPE limit. (3) Supervisory,

clerical and custodial personnel working in laser areas where laser safety procedures preclude their exposure to levels of laser radiation above the MPE limit. (4) Operators of fielded military laser systems when operations are conducted on established laser ranges, or as part of training operations where prescribed laser safety procedures are enforced. (5) Personnel involved in "force-on-force" laser training exercises where appropriate protection is established, either in the form of administrative controls or procedures, or where laser protective eyewear is provided.

B0906. RADIATION INCIDENTS

a. Ionizing Radiation. In the event of a radiation incident involving ionizing radiation, notify NAVSEADET RASO for incidents associated with industrial operations and NAVENVIRHLTHCEN for medical and dental incidents.

b. Radiofrequency Radiation

(1) Commands shall investigate and document all suspected RF incidents or mishaps involving personnel exposure to excessive RF levels, in accordance with reference B9-7 and B9-15 such as:

(a) Personnel injury has been sustained or physical symptoms are experienced by the individual(s) that are believed to be associated with RF exposure.

(b) Personnel exposure has been determined to have exceeded the appropriate MPE limit in terms of power density by a factor of five or more. (For exposure determinations, provisions for time averaging and spatial averaging can be used in conjunction with transmitter duty factors and antenna rotation or scanning rates to establish maximum likely exposure levels).

(c) Inadvertent exposure occurred to members of the general public or to other non-involved personnel as a result of naval operations that have exceeded the appropriate MPE limit.

(d) Exposure circumstances or the severity of the incident or mishap are such that inquires from news media are

anticipated, or are deemed to be of interest to the chain of command.

(2) Investigation of incidents involving alleged or actual RFR exposures that are five times the MPE or greater shall include, as a minimum:

(a) A listing of all involved personnel.

(b) Measurements of RFR exposure levels.

(c) Results of appropriate medical examinations.

(d) A detailed description of the circumstances surrounding the incident.

(e) Recommendations for more detailed medical follow-up (if necessary).

(f) Recommendations to prevent future recurrence of the incident.

(3) The command exercising operational control of the RF source has the primary lead for conducting the RF exposure investigation and for ensuring the appropriate report is filed.

(4) Commands shall refer personnel reporting physical symptoms, or suspected of having been exposed to levels in excess of five times the MPE limit, for a medical evaluation or follow-up. Since medical evaluations following RF exposures have been infrequently required and physical signs of injury are usually not manifested, medical personnel should be advised to refer to reference B9-19, for information on RF biological effects.

(5) Commands shall make initial notification for the occurrence of an RF incident by telephone, fax, message or e-mail to the appropriate technical assistance point listed in this chapter with copy to the Bureau of Medicine and Surgery (Code M342). Discussions following this initial notification can determine whether a more extensive investigation will be necessary and whether a site visit should be scheduled to assist in making RF measurements or an exposure evaluation. Central to the command's investigation will be a determination of the

degree of RF exposure incurred since such incidents often involve emotional or health concerns which cannot be easily addressed when measurement data is not available. Performing RF measurement assessments are often beyond the technical capabilities of the local command or the nearby medical facility.

(6) If exposure incident results in a service member receiving medical treatment, loses workdays, or is placed on light or limited duty, a mishap report must be submitted in accordance with reference B9-32.

(7) In cases where it is necessary to reconstruct events or reestablish equipment configuration for conducting an RF exposure assessment, the accuracy of the recreation is crucial to the validity of the subsequent RF measurements. The command's investigating officer should apply particular attention to obtaining written statements from those involved giving detailed descriptions of the sequence of events, exposure times and equipment set-ups, as well as obtaining appropriate charts, diagrams or photographs indicating the locations of exposed personnel.

(8) The command shall submit a final report on the RF incident to the Commander, Naval Safety Center and to the Bureau of Medicine and Surgery (Code M342), with copies to appropriate headquarters and systems commands. The command will also include in the report to BUMED pertinent medical records and identification data for personnel who were exposed. BUMED is tasked with maintaining a permanent repository for RF exposure incidents.

c. Laser Radiation

(1) If eye damage from laser exposure is suspected or observed, and in all cases of exposure to levels in excess of five times the laser exposure limits of this chapter, the cognizant activity shall ensure the individual receives a medical examination by an ophthalmologist as soon as possible. While laser injuries associated with military operations have been rare, limited experience indicates that the extent of eye damage from an accidental laser exposure may not be readily or initially apparent to either the individual or to local medical personnel. Since early medical intervention may lessen the severity of the damage or subsequent retinal scarring from the

laser injury, efforts should be made to have the individual promptly seen by an ophthalmologist or at the ophthalmology department of a hospital on a walk-in emergency basis.

(2) Commands shall investigate and document all suspected laser incidents or mishaps involving personnel exposure to excessive laser energy. The command exercising operational control of the laser has the primary lead for conducting the laser exposure investigation and for ensuring the appropriate report is filed.

(3) Commands are required to report exposure incidents and investigate exposure levels for the following situations: (1) Personnel injury has been sustained or physical symptoms are experienced by the individual(s), which are believed to be associated with laser exposure. (2) Inadvertent exposure occurred to members of the general public or to other non-involved personnel as a result of naval operations, which have exceeded the MPE limit. (3) Exposure circumstances or the severity of the incident or mishap are such that inquires from news media are anticipated, or are deemed to be of interest to the chain-of-command.

(4) Commands shall refer personnel reporting physical symptoms or suspected of having been exposed to levels in excess of the MPE limit for a medical evaluation or follow-up.

(5) Commands shall make initial notification for the occurrence of a laser incident by telephone, fax, message or e-mail to the appropriate technical assistance point listed in this appendix with copy to the Bureau of Medicine and Surgery (Code M342). Discussions following this initial notification can determine whether a more extensive investigation will be necessary and whether a site visit should be scheduled to assist in making laser measurements or an exposure evaluation. Central to the command’s investigation will be a determination of the degree of laser exposure incurred since such incidents often involve emotional concerns or health worries, which cannot be easily addressed when measurement data is not available. Performing laser measurement assessments are often beyond the technical capabilities of the local command or the nearby medical facility.

(6) In cases where it is necessary to reconstruct events or reestablish equipment configuration for conducting a laser exposure assessment, the accuracy of the recreation is crucial to the validity of the subsequent measurements. The command's investigating officer should apply particular attention to obtaining written statements from those involved giving detailed descriptions of the sequence of events, exposure times and equipment set-ups, as well as obtaining appropriate charts, diagrams or photographs indicating the locations of exposed personnel.

(7) The command shall submit a final report on the laser incident to the Commander, Naval Safety Center, and to the Bureau of Medicine and Surgery (Code M342), with copies to appropriate headquarters and systems commands within 30 days of the incident.

(8) Investigation of incidents involving alleged or actual laser exposure shall include as a minimum the following:

(a) List of personnel involved.

(b) Estimation of exposure(s) as related to the applicable MPE.

(c) Details of immediate and subsequent medical findings.

(d) Narrative account/summary of exposure incident—to include wavelength, mode of operation(s) and energy/power output.

(e) Details regarding safety procedures and equipment used.

(f) The command shall also include in the report to BUMED pertinent medical records, retinal photographs and identification data for personnel who were exposed.

(9) If exposure incident results in a service member receiving medical treatment, loses workdays, or is placed on light or limited duty, a mishap report must be submitted in accordance with reference B9-32.

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CHAPTER B9

REFERENCES

B9-1. NAVSEA S0420-AA-RAD-010, Radiological Affairs Support Program (RASP) Manual (NOTAL)

B9-2. OPNAVINST 6470.2A

B9-3. OPNAVINST 6470.3

B9-4. NAVSEA 389-0288, Radiological Controls for Shipyards (NOTAL)

B9-5. ANSI C95.6, IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 to 3 kHz (NOTAL)

B9-6. ANSI C95.1, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz (NOTAL)

B9-7. DoD Instruction 6055.11, Protection of DoD Personnel from Exposure to Radiofrequency Radiation

B9-8. ANSI Z136.1, The American National Standard for the Safe Use of Lasers (NOTAL)

B9-9. ANSI Z136.3, The American National Standard for the Safe Use of Lasers in Health Care Facilities

B9-10. NAVMED P-5055, Radiation Health Protection Manual

B9-11. BUMEDINST 6470.22, Navy Radiological Systems Performance Evaluation Program

B9-12. Navy Environmental Health Center Technical Manual NEHC - TM 6470.03-1, Navy Radiological Systems Performance Evaluation Manual

B9-13. BUMEDINST 6470.10B, Initial Management of Irradiated or Radioactively Contaminated Personnel

B9-14. DoD 6055.5-M, Occupational Health Surveillance Manual

B9-15. OPNAVINST 5100.27A/MCO 5104.1B

B9-16. BUMEDINST 6470.19A, Laser Safety for Medical Facilities

B9-17. NAVSEA OP 3565/NAVAIR 16-1-529/NAVELEX 0967-LP-624-6010, Electromagnetic Radiation Hazards (Hazards to Personnel, Fuel, and other Flammable Material)

B9-18. MIL-STD-464A, Electromagnetic Environmental Effects Requirements for Systems

B9-19. BUMEDINST 6470.23, Medical Management of Non-Ionizing Radiation Casualties

B9-20. ANSI C95.2, IEEE Standard for Radio-Frequency Energy and Current Flow Symbols (NOTAL)

B9-21. ANSI C95.3, IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to such Fields, 100 kHz t 300 GHz (NOTAL)

B9-22. ANSI C95.4, IEEE Recommended Practice for Determining Safe Distances from Radio Frequency Transmitting Antennas when Using Electric Blasting Caps (NOTAL)

B9-23. ANSI C95.7, IEEE Recommended Practice for Radio Frequency Safety Programs (NOTAL)

B9-24.21 CFR Part 1040, FDA Performance Standards for Light Emitting Products

B9-25. SECNAVINST 5100.14C

B9-26. MIL-HDBK-828A, Laser Safety on Ranges and in Other Outdoors Areas

B9-27. ANSI Z136.7, The American National Standard for Laser Eye Protection and Protective Devices (NOTAL)

B9-28. ANSI Z136.2, The American National Standard for the Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode And LED Sources (NOTAL)

B9-29. ANSI Z136.4, The American National Standard for Laser Safety Measurements and Instrumentation (NOTAL)

B9-30. ANSI Z136.5, The American National Standard for the Safe Use of Lasers in Educational Institutions

B9-31. ANSI Z136.6, The American National Standard for the Safe Use of Lasers Outdoors (NOTAL)

B9-32. NAVSEA S9040-AA-GTP-010/SSCR, Shipboard Systems Certification Requirements for Surface Ship Industrial Periods (Non-Nuclear) (NOTAL)

Appendix B9-A

CHAPTER B9 RADIATION INSTRUCTIONS, STANDARDS, REGULATIONSM, MANUALS, AND HANDBOOKS

A. THOSE CONTAINING IONIZING RADIATION GUIDENCE:

NAVMED P-5055, Radiation Health Protection Manual

This manual provides the radiation health requirements applicable to Navy and Marine Corps radiation protection programs. A radiation protection program may be defined as the sum of all methods, plans, and procedures used to protect the health and environment of personnel from exposure to sources of ionizing radiation. It includes the radiation health program and radiological controls program.

These regulations are intended for observance during peacetime by all Navy and Marine Corps activities possessing or using sources of ionizing radiation which may affect the health of personnel. These standards do not apply to the exposure of an individual to ionizing radiation when used for the diagnosis or treatment of medical or dental conditions of that individual. Personnel not employed by the Department of the Navy shall comply in all respects with these regulations when engaged in a Navy sponsored program or operation. It is recognized that these regulations may not be applicable to procedures initiated after an attack in which nuclear weapons are used; however, the provisions of these regulations, insofar as they are feasible, shall remain in effect after such an attack.

BUMEDINST 6470.22, Navy Radiological Systems Performance Evaluation Program

This instruction provides guidance on the radiological safety management of all diagnostic imaging systems in Navy Medicine that use ionizing radiation. This instruction applies to all naval facilities and commands, ashore or afloat, and Navy Medical Department sponsored operations having medical and dental radiological systems. For implementation procedures this instruction references

the Navy Environmental Health Center Technical Manual (NEHC) TM 6470.03-1, "Navy Radiological Systems Performance Evaluation Manual."

Navy Environmental Health Center Technical Manual NEHC -TM 6470.03-1, Navy Radiological Systems Performance Evaluation Manual

This manual provides the surveyor with standard procedures for acceptance testing and periodic testing of medical diagnostic medical equipment that employs ionizing radiation for ships and shore stations. This manual establishes periodicity of surveys, parameters to be measured, training and qualification of surveyors, and reporting requirements. This manual does not address therapeutic medical equipment that employs ionizing radiation.

BUMEDINST 6470.10B, Initial Management of Irradiated or Radioactively Contaminated Personnel

To provide direction to the Medical Department, civilian medical personnel of the naval services, and Navy and Marine Corps commands for the initial exposure assessment, management, and treatment of individuals who are irradiated or externally or internally radioactively contaminated.

This instruction applies to all naval facilities or commands and Navy-sponsored operations in which there exists a known potential for radioactive contamination or excessive ionizing radiation exposure and to all medical treatment facilities (MTFs), fixed and non-fixed. This instruction applies to the period from actual exposure, contamination, or injury to the time when the individual is either returned to full-duty or, if a seriously injured individual is on a course of recovery at an MTF with definitive care capability. Although applicable to personnel irradiation or contamination following a nuclear weapon detonation in a time of war, the procedures outlined in this instruction are intended for use in occupational or accidental exposure environments.

NAVSEA 389-0288, Radiological Controls for Shipyards

This manual presents the limits and protection measures applicable to ionizing radiation and radioactivity associated with constructing, servicing, and decommissioning U.S. naval nuclear propulsion plants; it does not cover control of radiation from nuclear weapons, medical uses, or other employment of radiation. The procedures and limits in this manual are applicable to shipyards, Fleet Maintenance Activities (FMAs), and naval reactors prototype sites.

NAVSEA TW120-AA-PRO-010, Nuclear Weapons Radiological Controls Program

This manual establishes the requirements for the Navy's nuclear weapons radiological controls program. This program is concerned with radiation exposure received during stowage, maintenance or handling of nuclear weapons and is not involved with radiation exposure from weapon detonation, fallout, naval nuclear propulsion plants, industrial or medical sources. The requirements of this manual apply to each ship, station or facility that stows, maintains, or handles nuclear weapons.

NAVSEA S9213-33-MMA-000/(V), Radiological Controls for Ships

This manual provides the radiological safety standards, procedures, and requirements for nuclear powered ships and in-hull propulsion plant operations and routine maintenance at naval reactor prototypes.

NAVSEA S0420-AA-RAD-010, Radiological Affairs Support Program (RASP) Manual

The RASP applies to all sources of ionizing radiation with the Navy and Marine Corps except nuclear propulsion, nuclear weapons, and medical-dental sources. Ships and shore stations shall comply with the standards and procedures of this manual and maintain effective radiation protection programs for any operation involving RASP ionizing radiation sources.

DoD Instruction 6055.8, Occupational Radiation Protection Program

DoD Instruction 6055.8 implements the United States Environmental Protection Agency "Radiation Protection Guidance to Federal Agencies for Occupational Exposure" of January 1987.

Applies to the Office of the Secretary of Defense (OSD), the military departments (including the Reserve components), the Joint Staff, the Unified and Specified Commands, the Defense Agencies, the DoD Field Activities, and the Army and Air Force Exchange Service (hereafter referred to collectively as "DoD Components"). Applies during peacetime to all DoD civilian and military personnel who are exposed to ionizing radiation worldwide, except personnel who, as patients, undergo diagnostic or therapeutic radiological procedures in medical or dental treatment facilities.

OPNAVINST 6470.2A, Occupational Radiation Protection Program

OPNAVINST 6470.2 formalizes the uniform occupational radiation protection program for the Department of the Navy, required by DoD Instruction 6055.8, to preserve and maintain the health of personnel while performing duties involving occupational exposure to sources of ionizing radiation.

OPNAVINST 6470.3, Navy Radiation Safety Committee

This instruction establishes the Navy radiation safety committee as a means for controlling the use of radioactive material within the Navy and Marine Corps.

This instruction applies to all Navy and Marine Corps activities engaged in the use of Nuclear Regulatory Commission (NRC) regulated byproduct material, special nuclear material, source material, and naturally occurring or accelerator-produced radioactive material. It does not apply to radioactive materials transferred from the Department of Energy (DOE) to the Department of Defense (DoD) in accordance with section 91B of the Atomic Energy Act of 1954. Nor does it apply to radioactive materials

produced as a consequence of the construction, operation, servicing or maintenance of naval nuclear propulsion plants.

B: THOSE CONTAINING BOTH RF AND LASER RADIATION GUIDENCE UNDER ONE DOCUMENT:

OPNAVINST 5100.23G, Navy Safety and Occupational Health (SOH) Program Manual, chapter 22, Non-Ionizing Radiation, and appendix 22 A and B.

This chapter implements SOH procedures for non-ionizing (RF and Laser) radiation protection requirements, exposure standards and safety guidelines for all levels of command (OPNAVINST 5100.19D is the implementing document for forces afloat). Provisions of this chapter do not apply to exposures administered to patients undergoing medical diagnostic or therapeutic procedures.

BUMEDINST 6470.23, Medical Management of Non-Ionizing Radiation Casualties

The purpose of this instruction is to issue MPE limits, medical surveillance requirements, and casualty management procedures for personnel exposed to non-ionizing (RF and Laser) electromagnetic radiation. It applies to all Departments of the Navy activities using sources of non-ionizing radiation that may affect the safety or health of personnel. Personnel not employed by the Department of the Navy must comply in all respects with this instruction when engaged in a Navy-sponsored program or operation, or when visiting Navy ships, aircraft, or stations. This instruction does not apply to the exposure of individuals to non-ionizing radiation when used for the diagnosis or treatment of medical or dental conditions of those individuals.

C: THOSE CONTAINING ONLY LASER RADIATION GUIDANCE:

OPNAVINST 5100.27A/MCO 5104.1B, Navy Laser Hazards Control Program

The purpose of this instruction is to prescribe Navy and Marine Corps policy and guidance in the identification and control of laser radiation hazards. The scope and provisions of this directive are mandatory for all Navy and Marine Corps activities. They apply to the design, use, and disposal of all equipment and systems capable of producing laser radiation including laser fiber optics, with the exception of medical and industrial lasers.

BUMEDINST 6470.19A, Laser Safety for Medical Facilities

This instruction provides laser safety guidance for medical facilities. It applies to all medical treatment and laboratory activities using lasers or laser systems. This instruction does not apply to the use of lasers or laser systems for military, industrial, or non-medical research applications.

SECNAVINST 5100.14C, Military Exempt Lasers

The purpose of this instruction is to implement DoD Instruction 6055.11, provide policy, and assign responsibilities per SECNAVINST 5100.10G for individual Navy laser products that are exempt from portions of the radiation safety performance standards of code of federal regulations, title 21. Actions required by this instruction apply to all Navy and Marine Corps activities that procure, fabricate, possess, use, store or dispose of laser products that are designed for combat, combat training or classified in the interest of national security. Laser products used in research, development, test or evaluation and which are components of systems intended for combat, combat training or classified are included. All other laser products must comply fully with code of federal regulations, title 21 and are not within the scope of this instruction.

MIL-HDBK-828A, Laser Safety on Ranges and in Other Outdoors Areas

The purpose of this handbook is to provide uniform guidance in evaluations for the safe use of military lasers and laser systems on DoD military reservations or military-controlled areas worldwide. It is intended to supplement each military service's established range procedures. It applies to all DoD ranges or operation test facilities where lasers are used and all DoD laser operations conducted on non- DoD controlled ranges or test facilities and all laser systems that have been evaluated by the health and safety specialists of each Service.

21 CFR Part 1040, FDA Performance Standards for Light Emitting Products

Classifies laser products and defines design features, labeling, and test requirements. Access on line at: http://www.navylasersafety.com/

ANSI Z136.1, The American National Standard for the Safe Use of Lasers

This is the fundamental commercial user standard that has been approved and adopted by the DON. This standard is meant for users, not manufacturers (commercial designers/manufacturers of lasers use FDA's 21 code of federal regulations (CFR) chapter I, subpart J, Part 1040). The ANSI standard provides guidance by defining control measures for each of the four laser classifications. It is applicable to lasers with wavelengths from 180 nm to 1 mm, and provides information on laser hazard evaluation.

ANSI Z136.2, The American National Standard for the Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode And LED Sources

ANSI Z136.3, The American National Standard for the Safe Use of Lasers in Health Care Facilities

ANSI Z136.4, The American National Standard for Laser Safety Measurements and Instrumentation

ANSI Z136.5, The American National Standard for the Safe Use of Lasers in Educational Institutions

ANSI Z136.6, The American National Standard for the Safe Use of Lasers Outdoors

ANSI Z136.7, The American National Standard for Laser Eye Protection and Protective Devices

D: THOSE CONTAINING ONLY RF RADIATION GUIDANCE:

DoD Instruction 6055.11, Protection of DoD Personnel from Exposure to Radiofrequency Radiation

This instruction provides MPE limits to RF EMF. This instruction also covers training requirements and over exposure reporting procedures. This instruction applies to all DoD civilian and military personnel who may be exposed to RF EMF, except for patients undergoing diagnostic or therapeutic procedures in medical and dental treatment facilities. This instruction applies during peace time and to the maximum extent possible during wartime, to limit personnel exposure to RF EMF.

NAVSEA OP 3565/NAVAIR 16-1-529/NAVELEX 0967-LP-624-6010, Electromagnetic Radiation Hazards (Hazards to Personnel, Fuel, and other Flammable Material)

The purpose of this volume is to prescribe operating procedures and precautions to prevent injury to personnel and ignition of volatile vapors from exposure to environmental electromagnetic radiation (EMR) to assist commanding officers in carrying out their responsibilities for EMR safety. The sources of this EMR include communications transmitters, radars, electronic countermeasures transmitters, and lasers. This manual also provides technical data and information concerning non-ionizing radio frequency (RF), hazards to personnel, fuel, and other flammable material, as well as laser hazards to personnel. The procedures and precautions prescribed herein apply in every instance within the naval establishment where a person or a flammable vapor mixture is exposed to RF fields of potentially hazardous intensity.

Operational commanders may waive compliance with any provision when essential under emergency conditions. When noncompliance with restrictions contained herein is essential, emergency procedures are suggested and background information is provided in order to explain and minimize the risks involved.

MIL-STD-464A, Electromagnetic Environmental Effects Requirements for Systems

This standard established electromagnetic environmental effects (E3) interface requirement and verification criteria for airborne, sea, space, and ground systems, including associated ordnance. This standard contains two sections, the main body and an appendix. The main body of the standard specifies a baseline set of requirements. The appendix portion provides rationale, guidance, and lessons learned for each requirement to enable the procuring activity to tailor the baseline requirement for a particular application.

ANSI C95.1, IEEE Standard for Safety Levels with Respect to Human Exposure to Radiofrequency Electromagnetic Fields, 3 kHz to 300 GHz

ANSI C95.2, IEEE Standard for Radiofrequency Energy and Current Flow Symbols

ANSI C95.3, IEEE Recommended Practice for Measurements and Computations of Radiofrequency Electromagnetic Fields with Respect to Human Exposure to such Fields, 100 kHz t 300 GHz

ANSI C95.4, IEEE Recommended Practice for Determining Safe Distances from Radiofrequency Transmitting Antennas when Using Electric Blasting Caps

ANSI C95.6, IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 to 3 kHz

ANSI C95.7, IEEE Recommended Practice for Radiofrequency Safety Programs

E: OTHER RELATED DOCUMENTS:

OPNAVINST 5102.1D/MCO P5102.1B, Navy and Marine Corps Mishap and Safety Investigation, Reporting, and Recordkeeping Manual

This instruction provides procedures for investigating and reporting material (property) damage, personnel injury/death, Navy civilian occupational injuries and illnesses, motor vehicle, explosive, and diving mishaps.

NAVSEA S9040-AA-GTP-010/SSCR, Shipboard Systems Certification Requirements for Surface Ship Industrial Periods (Non-Nuclear)

DoD 6055.5-M, Occupational Health Surveillance Manual

CHAPTER B10

LEAD CONTROL

B1001. DISCUSSION

a. The purpose of this chapter is to prevent lead intoxication and related injuries during the use, handling, removal and melting of materials containing lead.

b. In this chapter, “lead” means metallic lead, all inorganic lead compounds, and organic lead soaps. Lead's low melting point, high molecular weight, high density and malleability make it useful structural material. When added to resins, grease, or rubber, lead compounds act as antioxidants. Common uses for lead and lead compounds include ballast, radiation shielding, paint filler and hardener, rubber and pipe joints, high voltage cable shielding, small arms ammunition, batteries and weights. While not an absolute indicator, red, forest green, chrome yellow and "school bus" yellow color paints typically contain lead compounds. Lead may also be found in polyurethane and water-based paints.

c. Significant lead exposures can occur during: lead and babbitt melting and casting; ballast handling; spraying, sanding, grinding, burning, and abrasive blasting of lead-containing materials and lead-containing paint; brazing with torches; high voltage cable repair; abrasive blasting with smelting slag; lead-acid battery reclaiming; machining lead; disassembly of gasoline engine components (which have used leaded gasoline); and handling of contaminated personal clothing.

d. Lead is a recognized health hazard. Lead may adversely affect the peripheral and central nervous systems, as well as the red blood cells, kidneys, reproductive and endocrine systems.

e. In recognition of the serious health hazards associated with lead and the numerous sources of potential lead exposure, the Navy has established strict controls to limit both occupational and environmental exposures. Standards and controls discussed in this chapter shall be applicable to all Navy personnel.

B1002. PERMISSIBLE EXPOSURE LIMIT AND ACTION LEVEL TRIGGERING REQUIREMENTS

a. Permissible Exposure Limit (PEL). The PEL for an eight-hour time-weighted average (TWA) exposure to airborne lead is 50 micrograms per cubic meter (ug/m^3) of air.

b. Action Level (AL). The AL for an eight-hour TWA exposure to airborne lead is 30 ug/m^3 (without regard to respirator use).

c. Biological monitoring and medical surveillance shall be initiated when an employee's exposure exceeds the AL for more than 30 days per year.

d. Engineering and administrative controls shall be initiated when an individual's exposure exceeds the PEL for more than 30 days per year. When a person's exposure is greater than the AL, but less than the PEL, engineering controls shall be initiated to reduce the workplace environmental level to a maximum of 200 ug/m^3. Thereafter, any combination of engineering and administrative controls may be used to maintain exposure at or below the PEL.

B1003. LEAD CONTROL RESPONSIBILITIES

a. Commanding officers shall not authorize paint removal for cosmetic reasons or due to excessive paint thickness. They may only authorize paint removal to protect the ship from corrosion, when incidental to hot work, and when bare metal is required for an inspection.

b. The safety officer shall:

(1) When applicable, as determined by the baseline industrial hygiene survey, establish effective shipboard lead control practices that include as a minimum those elements in paragraph B1004.

(2) Verify that the ship has the proper clothing and equipment aboard to protect personnel during shipboard lead work.

(3) Notify the commanding officer when sufficient funds are unavailable to obtain mandatory protective clothing

and equipment to protect ship's force personnel during shipboard lead work.

(4) If specified in the baseline industrial hygiene survey, ensure a written compliance plan to comply with lead control requirements is available. The supporting industrial hygiene officer/industrial hygienist shall prepare this plan.

(5) Implement lead hazard training for all personnel identified in the baseline industrial hygiene survey as potentially exposed to lead at or above the AL.

(6) Request industrial hygiene assistance for the evaluation of new potential lead hazards.

c. Division officers shall:

(1) Ensure that personnel required to perform work involving lead exposure are provided with proper clothing and equipment and trained in its use.

(2) Ensure that personnel who work with lead or who work in areas where the potential exists for lead exposure at or above the AL are properly trained.

(3) Identify to the medical department representative (MDR), personnel who work with lead or who work in areas where the potential exists for lead exposure at or above the AL.

d. The Medical department representative (MDR) shall:

(1) Assist the safety officer with conducting lead hazard training upon request.

(2) Schedule personnel for blood lead analysis and physical examinations at shore medical activities as required for medical surveillance.

e. All hands shall:

(1) Obtain and properly use protective equipment and use safe work practices as trained when working with lead.

(2) Report for medical surveillance tests and examinations, when scheduled.

B1004. LEAD CONTROL ELEMENTS

The following elements, as a minimum, are necessary to carry out effective lead control:

a. Industrial hygiene survey (paragraph B1005);

b. Control of lead in the workplace environment (paragraph B1006);

c. Waste disposal procedures (paragraph B1007);

d. Medical surveillance (paragraph B1008);

e. Written compliance plan (paragraph B1009);

f. Worker and supervisor training (paragraph B1010).

B1005. INDUSTRIAL HYGIENE SURVEY

a. An industrial hygienist shall evaluate all workplaces in which lead is used. This evaluation shall be accomplished during the baseline and periodic industrial hygiene surveys specified per chapter A3. Where a potential for exposure from inhalation of airborne lead particulate or personnel contamination is found, the industrial hygienist shall establish an exposure monitoring plan to characterize personnel exposures. When personnel lead exposures warrant, the industrial hygiene survey shall identify the need for the command to have a written lead hazard compliance plan and provide the specific content for the plan.

b. Within five working days after the receipt of exposure monitoring results, the command shall notify affected personnel in writing of results that represent their exposure. Whenever the results indicate that the individual was exposed above the PEL, without regard to respirator use, the written statement shall include that fact and a description of the corrective action(s) taken to reduce the individual’s exposure.

c. If the safety officer or any supervisor has a question regarding the potential lead hazards and appropriate controls involving an operation which includes or potentially includes lead, the safety officer shall request industrial hygiene officer assistance from a tender, staff or local medical treatment facility or Navy Environmental and Preventive Medicine Unit (NAVENPVNTMEDU).

B1006. CONTROL OF LEAD IN THE WORKPLACE ENVIRONMENT

There are seven basic principles to be used when working with lead or materials that contain lead:

a. General Workplace Control Practices

(1) Use non-lead paint.

(2) Keep mechanical grinding and sanding to the absolute minimum with primary reliance on impact tools and authorized chemical strippers for paint removal. Mechanical tools equipped with high efficiency particulate air (HEPA) filtered exhaust for removal and reclamation of lead dust are preferred.

(3) When feasible, minimize the heating of lead and leaded materials by using thermostatically-controlled heating (below 600 degrees Fahrenheit) or removing the lead-containing surface coatings or contaminants prior to heating.

(4) Establish procedures to maintain work surfaces as free of lead dust as is practical. Clean up lead dust with a HEPA filtered vacuum cleaner. Wet sweeping, wet brushing and wiping down with wet rags may be effective in removing lead dust. Rags used for wiping down shall be disposed of as lead waste.

(5) Lead-containing waste, scrap, debris, containers, equipment and clothing consigned for disposal shall be collected, sealed, and labeled in impermeable containers. Transportation shall be conducted in a manner that does not release airborne dust or pollute surrounding waterways. Dispose of lead waste per the procedures of chapter B3.

(6) To minimize exposure potential, isolate hot work on lead and abrasive lead removal operations from other operations.

b. Ventilation

(1) If deemed necessary by the cognizant industrial hygienist, provide fixed local exhaust ventilation connected to high efficiency particulate air filters at the point of particulate generation.

(2) Do not exhaust emissions to another workspace.

c. Personal Protective Clothing and Related Control Facilities

(1) Personnel engaged in the handling of lead or in situations where the concentration of airborne particulate lead is likely to exceed the PEL, or where the possibility of skin or eye irritation exists shall remove uniform clothing and wear protective clothing. Consult the command's industrial hygiene officer, industrial hygiene survey, or contact the local BUMED industrial hygienist for specific clothing requirements. Clothing shall be waterproof when wet lead is handled.

(2) Personnel shall remove protective clothing before leaving the work area.

(3) Provide change rooms as close as practical to the lead work area(s) for personnel who work where the airborne lead exposure is above the PEL (without regard to the use of respirators). When possible, locate shower facilities between the "clean" and "dirty" change rooms. Consult the command's industrial hygiene officer, industrial hygiene survey, or contact the local BUMED industrial hygienist for specific decontamination facility requirements.

(4) Launder lead-contaminated clothing to prevent release of lead dust in excess of the AL. Transport lead-contaminated clothing in a sealed container with the standard "caution label" affixed (see paragraph B1006(e)). Notify persons who clean or launder protective clothing or equipment in writing of the potentially harmful effects of exposure to lead

and monitor these persons for exposure to lead as required by paragraph B1005.

d. Respiratory Protection

(1) Respirators are required where the concentration of airborne, particulate lead is likely to exceed the PEL.

(2) Consult the command's respiratory protection program manager (RPPM), industrial hygiene survey, or contact the local BUMED industrial hygienist for specific respirator requirements.

e. Warning Signs and Caution Labels

(1) **Warning signs** shall be provided and displayed at each location where airborne lead concentrations may exceed the PEL. Signs shall state, as a minimum, the following:

WARNING
LEAD WORK AREA
POISON
NO SMOKING, EATING OR DRINKING

(2) **Caution labels** shall be affixed to containers of lead-contaminated clothing and equipment, raw materials, waste, debris, or other products containing lead. These caution labels shall state:

CAUTION

CLOTHING CONTAMINATED WITH LEAD
DO NOT REMOVE DUST BY BLOWING OR SHAKING
DISPOSE OF LEAD CONTAMINATED WASH WATER ACCORDING TO APPLICABLE LOCAL, STATE OR FEDERAL REGULATIONS

f. Housekeeping

(1) Where lead containing materials are routinely melted, ground or cut, maintain all surfaces as free as practical of lead accumulation. Clean surfaces at least once per shift to prevent accumulation of lead dust.

(2) All cleaning shall use methods such as vacuuming with HEPA filtered vacuum cleaners or washing down where feasible, observing water pollution regulations as they pertain to lead-contaminated wastewater. Only use wet sweeping, shoveling or brushing shall when other methods have been tried and found to be ineffective or infeasible.

(3) Do not use compressed air to clean work surfaces.

(4) When wash down procedures are used to clean surfaces or wetting is used to control dust, treat floor surfaces with a non-skid agent and drain the floor so that excess water is collected in a holding tank for disposal per chapter B3.

g. Personal Hygiene

(1) Prohibit eating, drinking, smoking, chewing of tobacco products or gum, the application of makeup, and storage of food and tobacco products in lead work areas.

(2) Personnel working with lead shall wash their hands and faces prior to eating, drinking, smoking or applying cosmetics.

B1007. WASTE DISPOSAL PROCEDURES

a. Lead-containing waste materials are classified as hazardous material and must be handled per chapter B3. Bag hazardous lead waste in heavy-duty plastic bags or other impermeable containers. Label bags with caution labels described in paragraph B1006e(2).

b. Label containers such as bags and trash cans **"LEAD WASTE ONLY."** Care must be exercised in order to prevent bags and other containers from rupturing when being moved.

B1008. MEDICAL SURVEILLANCE

a. Medical surveillance consists of: pre-placement medical evaluation, blood lead monitoring, and follow-up medical evaluation based on the results of blood lead analysis, worker complaint, and physician opinion. The lead medical surveillance examination and forms can be found in the medical matrix of

reference B10-1 as examination #161. Personnel are included in this program when industrial hygiene surveillance indicates that they perform work or are likely to be in the vicinity of an operation which generates airborne lead concentrations at or above the AL more than 30 days per year. Inclusion in this program is based on measured airborne concentrations without regard to respirator use, and therefore does not indicate that an individual is overexposed to lead.

b. Within five days of receipt of blood lead monitoring results, the command shall notify affected personnel in writing of his/her blood lead if their blood lead level is at or above 30 ug/100gm. Notification should include the criteria for removal from lead work and, if appropriate, notification that the person is being temporarily removed from lead exposure per reference B10-2. If an individual is pregnant, she should be counseled on the possible adverse affects to the pregnancy or fetus. A decision regarding any action to be taken will be made by the physician on a case-by-case basis.

c. All records of examinations, possible lead-related conditions, related laboratory results and all forms and correspondence related to the person's medical history shall become a permanent part of the health record and be retained for the period of naval service plus 20 years, or 40 years after the date of the last entry, whichever is longer.

B1009. WRITTEN COMPLIANCE PLAN

The supporting industrial hygiene officer or industrial hygienist shall prepare a written compliance plan for processes that produce exposures in excess of the PEL as specified in reference B10-2. The ship only needs a lead compliance plan if lead processes are identified during the baseline industrial hygiene survey. These plans shall include the following items, at a minimum:

a. A description of each operation in which lead is emitted; (e.g., machinery used, material processed, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices);

b. A description of the specific means that will be employed to achieve compliance, including engineering plans and

studies used to determine methods selected for controlling exposure to lead;

c. A report of the technology considered in meeting the permissible exposure limit;

d. Air monitoring data that documents the source of lead emission;

e. A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.;

f. A work practice program which includes items required under paragraphs (g), (h) and (i) of reference B10-2;

g. An administrative control schedule required by paragraph (e)(6) of reference B10-2, if applicable; and

h. Other relevant information.

The supporting industrial hygiene officer/industrial hygienist shall review written plans and update as necessary at least every six months to reflect the current status.

B1010. TRAINING

a. All personnel who are potentially exposed to lead at or above the AL, and their supervisors shall receive initial training prior to such assignment and at least annually thereafter. This training shall, at a minimum, include the following:

(1) The specific nature of operations during which exposure is possible;

(2) The purpose, proper selection, fit testing, use and limitations of respirators;

(3) The adverse health effects of lead with particular attention to the reproductive effects upon both males and females, including the possible adverse effects on pregnancy and the fetus;

(4) The purpose and description of the medical surveillance program, including the use of chelating agents;

(5) The engineering controls and work practices to be applied and used in the work, including personal protective equipment and personal hygiene measures;

(6) The contents of any compliance plan in effect; and

(7) The command shall procure sufficient copies of reference B10-1 from the Department of Labor and make them available to personnel required to receive training. They should be provided with appendix B (employee standard summary) of reference B10-2 and, upon request, any other handout-type materials used in or related to the training.

b. All painted surfaces that cannot be identified as lead-free through laboratory analysis must be handled as containing lead. Division officers shall train personnel assigned to remove paint per the safety precaution for paint removal in chapters C18 and D12.

CHAPTER B10

REFERENCES

B10-1. NEHC TM OM-6260, Medical Surveillance Procedures Manual and Medical Matrix

B10-2. 29 Code of Federal Regulations (CFR) 1910.1025, Lead

CHAPTER B11

TAG-OUT

B1101. DISCUSSION

a. A tag-out procedure is necessary because of the complexity of modern ships and the cost, delays, and hazards to personnel which could result from improper operation of equipment or the inadvertent release of stored energy. In order to prevent injury to personnel and damage to equipment, the tag-out program is mandatory for all-shipboard equipment, components, and systems. The program is designed to notify personnel that tagged out equipment or systems are not in a normal operating condition. The tag-out procedure consists of a series of tags or adhesive labels that are applied to instruments, gauges, or meters to indicate that they are inoperative, restricted use, or out of calibration. Each tag contains information necessary to avoid a possible mishap. Standard tag-out procedures are to be used for shipboard work performed by any activity. Tag-out procedures shall be enforced at all times. The use of tags or labels is not a substitute for other safety measures such as chaining or locking valves, removing fuses, or racking out circuit breakers. If any system, portion of a system, component, equipment, or instrument has more than one type of tag or sticker, the **DANGER (RED)** tag, when present, shall take precedence over all other tags or stickers.

b. Reference B11-1 is the primary technical reference for all tag-out procedures conducted by ship's crew.

c. A tag-out program checklist is provided in appendix B11-A

CHAPTER B11

REFERENCES

B11-1. NAVSEA S0400-AD-URM-010/TUM, Tag-Out User's Manual (NOTAL)

Appendix B11-A

TAG-OUT PROGRAM CHECKLIST

Indicate by an X, the answer to each of the questions below. If a question is not applicable to the command, indicate by NA in the YES block. Explain or describe the condition warranting any NO answer on the space provided at the end of the checklist or on additional sheets, if necessary.

The location of the reference for any question is provided at the end of the question.

	YES	NO
PROGRAM RESPONSIBILITIES		
1. Do department heads ensure that personnel assigned to their respective areas understand and comply with reference (B11-1, 1.3.1.a)?		
2. Do supervisory watchstanders review associated tag-out logs during watch relief and shift turnover? (B11-1, 1.3.1.c)		
3. Is the authorizing officer responsible for the administration of their cognizant tag-out log? (B11-1, 1.3.2.a)		
4. Is the authorizing officer for the engineering tag-out log the watch/duty officer for the propulsion plant? (B11-1, 1.3.2.c)		
TAG-OUT ESTABLISHMENT		
5. Has the type commander specified the number of logs to be maintained by ship class and where the log shall be maintained? (B-11,1.5.1.a)		

6.	Are sufficient tags used to completely isolate equipment or prevent operation of equipment from all stations that could exercise control? (B-11-1,1.5.2.b(1))		
7.	Before authorization does the authorizing officer check the tag coverage for adequacy, and check the tags and TORS for completeness and accuracy? (B-11-1, 1.6.3.c)		
8.	Are tag-outs carefully planned in an effort to minimize unnecessary record sheets and tags to maintain better control of the tag-out process? (B11-1, 1.5.2.b(3))		
9.	Does a second qualified person independently determine the adequacy and accuracy of the TORS and tags? (B-11-1, 1.6.2)		
10.	Does a second person independently ensure that the correct component is tagged, and check (verify) proper component positioning and tag attachment? (B11-1, 1.6.5)		
11.	Is the authorizing officer final authority for the final authority for commencement of work? (B11-1, 1.6.6.b)		
12.	Does the log contain the following sections: B-11,1.5.1.c)? a. A copy of the equipment tag-out bill and amplifying instructions?		
	b. DANGER/CAUTION Tag-out index and record of audits?		
	c. Effective DANGER/CAUTION Tag-out record sheets?		
	d. Instrument log?		
	e. Cleared DANGER/CAUTION tag-out record sheets?		
13.	Are danger and caution tags removed immediately when the situation requiring the tag-out has been corrected and the clearing of tags has been authorized? (B-11-1, 1.8.1)		

14. Does the authorizing officer specify in block 19 of the TORS the desired position or condition of the tagged item after the tag has been removed? (B11-1, 1.8.3)		
TAG-OUT AUDIT 15. Does the department head ensure that audits are performed every two weeks, and for ships in overhaul, conversion, or restricted availability, conduct audits of the propulsion plant tag-out log(s) weekly? (B11-1, 1.7.4.a(1))		
16. Does ships force check all outstanding tags on each TORS for correct posting by visually comparing the information on the tag, on the TORS, and on the component for the tag audit? (B11-1, 1.7.4.b(1))		
17. Are the results for the tag audits recorded on the back of the TORS under the last tag listed or on an audit record sheet? (record the date completed, the discrepancies noted, and the signature of the person doing the audit) (B11-1, 1.7.4.b(3))		
18. Are all outstanding TORS audited against the tag-out index sheet? (B11-1, 1.7.4.c.(1))		
19. Are the results of the TORS audit entered on the index sheet, or an audit record sheet? (record the date completed, the discrepancies noted, and the signature of the person conducting the audit (B11-1, 1.7.4.c(2))		
20. Does the authorizing officer report the results of the audit to the applicable department head? (B-11-1, 1.7.4.a(2))		
21. Do special instructions on the back of the CAUTION tags checked state specific conditions under which the tagged object may be operated? (B11-1, 1.5.2.d)		

22. Do out of calibration labels checked indicate a correction factor to be applied to the instrument? (B11-1,1.10.1.a.(1))		
TRAINING 23. Do all newly reported personnel receive indoctrination training on the tag-out program? (B11-1, 1.4.a)		
24. Do personnel assigned to prepare tag-outs, review tag-outs, position equipment, post (attach) tags, check posted tags, clear (remove) tags, or perform tag audits, qualified on the tag-out users manual? (B11-1,1.4)		
25. Is the authorizing officer responsible for ensuring that ship’s force personnel assigned to make a tag-out are qualified to perform the duties under this manual? (B-11-1,1.4)		
26. Are Tag-out users manual training topics included in the ship’s continuing training program? (B-11,1.4.b)		
27. Does ship's force qualify in the tag-out users manual prior to the completion of 3M 301 personnel qualification standard, and if required, completion of departmental qualifications? (B-11,1.4.d)		

CHAPTER B12

PERSONAL PROTECTIVE EQUIPMENT

B1201. DISCUSSION

This chapter provides procedures for provision and use of personal protective equipment (PPE). Chapters B1, B3, B4, B5, B6, B8, B9 and B10 contain more detailed instructions for use and maintenance of certain specialized equipment. See reference B12-1 for additional information on PPE. Appendix B12-A contains stock number information for ordering PPE. Check naval supply system for most current stock and ordering information.

PPE establishes a "last line of defense" against exposure to workplace hazards, and in some cases, may be the only means of protection. Any personal protective equipment breakdown, failure, or misuse immediately exposes the wearer to the hazard. For this reason, proper equipment selection and maintenance, personnel training (including equipment limitations), and enforcement of protective equipment maintenance, configuration, and use are key elements to an effective personal protective effort.

NOTE:

Preparation for any availability should include careful assessment of PPE needs over the entire period to ensure an adequate supply.

B1202. RESPONSIBILITIES

a. The commanding officer shall ensure that there is sufficient PPE aboard to meet the needs of his/her command. He/she shall ensure that adequate funding is provided to obtain or replace missing or worn out personal protective equipment.

b. The safety officer shall ensure that the use of PPE is monitored for required work or in required spaces, as well as being worn in a proper and effective manner. PPE selection should be based on the workplace evaluation and recommendations contained in the applicable sections of the baseline or periodic industrial hygiene survey, naval ship’s technical manual (NSTM),

hazardous materials user's guide (HMUG) and maintenance requirement card (MRC). Appendix B12-B contains a checklist that can be used for program assessment and evaluation.

c. Division officers shall budget for, procure, and stock personal protective clothing and equipment and provide it to personnel as needed. Division officers shall ensure that the supply officer is aware of required changes to the allowance of PPE so that coordinated shipboard/shore-based allowance list (COSAL), allowance parts list (APL) or authorized equipment list (AEL) can be changed accordingly. Once equipment is acquired, division officers shall ensure that it is properly maintained. Additionally, division officers shall ensure that assigned personnel are adequately trained on the type and proper use of PPE required at their work stations and shall enforce the proper use and wearing of protective equipment.

d. All hands shall ensure that they wear or use the required PPE to perform assigned work in a proper manner. If the required equipment is not available to do the assigned work, or if instruction is needed on how to wear or use the equipment, the affected person shall notify his/her supervisor immediately. MDR shall assist in obtaining and providing medically fitted PPE.

B1203. PROTECTIVE EQUIPMENT

a. Head Protection. Helmets or hard hats protect crew members from the impact of falling and flying objects, from impact with low overheads, and on a limited basis, from electric shock and burn.

(1) Metal hard hats are not authorized for shipboard use.

(2) Stow helmets or hard hats in a manner so that cracks will not develop in hat material. Do not stow heavy materials atop composite material hard hats.

(3) Do not wear hard hats if cracked, if the hat material has a hole other than one caused by the manufacturer, if missing the suspension harness, or if painted. Such hard hats will be turned in and replaced.

(4) Do not drill any holes in hard hats or modify them in any way. Such action will greatly reduce the protective

capability of the headwear. Affixing decals on protective headwear is permitted.

(5) Protective headwear for cold weather (watch caps, stocking caps, ball caps, etc.) may be worn with the hard hat if it does not interfere with correct fit.

b. Foot Protection. Shipboard environments such as flight decks, hangar decks, machine shops, pipe shops, heavy supply parts stowage areas, replenishment areas, and rigging sponsons expose personnel in some degree to foot hazards.

(1) Leather shoes are required for all personnel aboard ship for normal daily wear. CORFAM® (or equivalent) shoes made of synthetic material may only be worn when immediately departing or returning to the ship or when specifically authorized by the commanding officer for ceremonial or other special occasions. Do not wear CORFAM® (or equivalent), plastic, synthetic or vinyl shoes in fire rooms, main machinery spaces or in hot work areas.

(2) Standard stock safety shoes, with built-in steel box toe protection and non-slip soles, are intended primarily to provide protection from falling and rolling objects. Enlisted personnel are issued safety shoes at recruit training commands. Officers shall be provided standard stock safety shoes when required by their work. Safety shoes should be periodically examined for worn soles and heels that would reduce the non-skid features of the shoe. Safety shoes shall be replaced when the upper leather is worn or develops cracks exposing the toe protection or the foot. When safety shoes exhibit wear such that safety protection is no longer afforded the command shall provide standard stock safety shoes as organizational clothing (similar to coveralls or foul weather gear).

(3) Special safety shoes:

(a) Semi-conductive safety shoes are used to dissipate static electricity.

(b) Safety shoes with special electrical hazard soles are used to guard against shock hazards when performing electrical work and shall be provided to EMs, ETs, and personnel working around high voltage.

(c) Safety shoes or boots with rubber or synthetic material are used for protection against acids, caustics and other liquid chemical hazards. They may or may not have toe protection.

(d) Molders boots (slip on), with toe protection, should be provided to welders to provide easy removal in case hot slag or metal drops in or on the boot.

(4) Protective shoes shall be stowed in a dry atmosphere. Where practical, they shall be stowed upright, allowing the insides to dry out.

c. Hand Protection. Hand hazards include handling sharp objects, working with chemicals or electrical equipment and hot work. The following guidance is provided:

(1) When handling sharp materials, such as sheet metal, wear leather gloves. Also wear leather gloves over electrical grade rubber gloves whenever the rubber gloves could be subjected to cutting by sharp or abrasive objects.

(2) Whenever it is necessary to work with portable electric tools or equipment in damp locations or when it is necessary to work on live electrical circuits or equipment, wear electrical grade insulating rubber gloves.

(3) Wear only gloves approved to handle acids, corrosives, solvents, and other industrial chemicals when required. The safety officer or hazardous material coordinator shall assist supervisors in the selection of gloves to protect against chemical hazards. Surgical, clear plastic, latex, or food-handler type gloves are not approved for use with hazardous materials.

(4) When it is necessary to handle hot items or perform hot work, even if tongs or other gripping/clamping tools are available, wear non-asbestos, insulated gloves.

(5) Wear Kevlar® or boning gloves when handling knives in food service situations.

(6) Do not wear gloves when operating machinery with rotating or moving parts or line handling when the gloves could be caught in the bite.

(7) Deck personnel shall be provided with leather gloves to protect against hand injury when handling sharp objects including wire rope or banding material.

(8) Stow rubber electrical insulating gloves in the box in which they came. Perform the appropriate planned maintenance on the gloves prior to stowage. Stow other rubber electrical safety protection equipment in a clean, dry, oil-free location. Care should be taken not to fold such equipment as folding will frequently result in cracks that will greatly reduce the insulating capability of the material.

(9) Do not use electrical insulating gloves for non-electrical work such as; general cleaning with cleansers, work involving solvents, work involving alkali material, or work involving acids. Cleaning products, acids and alkalis will degrade the insulating properties of the gloves making them unsafe for electrical work.

d. Safety Clothing. Special clothing may consist of fire resistant coveralls, disposable coveralls, impervious chemical spill coveralls, welding leathers, and chemical aprons. These items may be specified as required by annual safety zone inspections, baseline industrial hygiene surveys, or standard work practices. Special clothing is required for personnel involved in emergency asbestos removals (see chapter B1). When operating/working in fossil fueled machinery spaces fire retardant coveralls shall be worn (see chapter C1). Synthetic clothing, such as certified Navy twill (CNT), may only be worn when immediately departing or returning to the ship or when specifically authorized by the commanding officer for ceremonial or other special occasions. Stow leather protection equipment in a clean, dry atmosphere. Hang up welding leathers.

e. Personal Fall Protection Equipment. When climbing, working aloft or over the side, wear a full-body safety harness with safety lanyard at all times. Additionally, use the following actions to provide maximum protection:

(1) Use wire rope lanyard when doing hot work.

(2) Perform MRC 6231/001-12 R-1, or perform the appropriate planned maintenance on the safety harness and safety lanyards before each use. Inspect safety harnesses, D-rings, and safety lines before each use.

(3) Ships shall train personnel who work aloft or over the side in the proper use of personal fall protection equipment.

(4) Do not use safety lanyards for any other purpose than personal fall protection. In particular, do not use them for hoisting heavy objects.

(5) Hang lanyards and full body harnesses used for personal fall protection equipment in a cool, dry atmosphere. Do not pile equipment one upon the other, as such action may prevent proper drying and result in rotting and weakening of lanyards. Rinse nylon lanyards and full body harnesses that have been exposed to salt water with fresh water before allowing equipment to air dry prior to storage.

f. Personal Flotation Devices. Whenever personnel, other than aircrew members and flight deck personnel, are required to wear life preservers in open sea operations, the life preservers must be the inherently buoyant or the MK-1. Those jacket-type life preservers are used by personnel in exposed battle stations, when working over the side, topside in heavy weather, during replenishment at sea, in small boats and other evolutions when personnel can be carried over the side. MK-1 life preservers should not be worn by personnel performing hot work or other actions that may cause damage to the bladder. Thoroughly dry life preservers prior to stowage. Following drying, stow them in designated clean and dry locations.

CHAPTER B12

REFERENCES

B12-1. Naval Ships Technical Manual (NSTM) 077

Appendix B12-A

PERSONAL PROTECTIVE EQUIPMENT STOCK NUMBER INFORMATION*

ITEM		NSN*
1. Head Protection:		
	Hard Hat	8415-01-025-9958
	Helmet, battle	8470-01-455-3325
	Helmet, Flight Deck Crew Cloth	8415-00-861-3527
	Helmet, liner	8470-01-455-3338
	Helmet, shell	8470-01-455-3331
	Pad, Back Assembly	8415-00-178-6830
	Pad, Front Assembly	8415-00-178-6831
	Shell Assembly, Front	8415-00-178-7013
	Shell Assembly, Back	8415-00-178-6855
2. Safety Shoes:	Steel Tip	8430-00-596-5396 through 6052 8430-01-032-2900 through 2909 8430-01-079-1252, MIL-S-21894
	Steel Tip Boots	8430-00-624-2151 (series)
	Molder's	8430-00-926-9966 (series)
	Electrical	8430-00-611-8314 (series)
	Rubber	8430-00-624-2151 (series)
3. Gloves:	Leather	8415-01-092-3910
	Butyl	8415-00-753-6551 through 6554
	Industrial (corrosive handling)	8415-00-266-8673, 8675, 8677, 8679
	Industrial (organic solvent handling)	8415-00-823-7456, 7457
	Kelvar® work gloves	41110-01-397-7346, 7348,7349
	Neoprene	8415-00-753-6551 through 6553
	PVC	8415-00-916-2817, 2818
	Rubber (chemical handling)	8415-00-753-6651 through 6654
	Rubber latex	8415-01-012-9294
	Protective Fuel and Oxidizer Resistant (Resin Modified Butyl)	8415-00-577-4091 (series)
	Chipper, Gauntlet Left	8415-00-559-1339 (series)
	Chipper, Gauntlet Right	(series)
	Cotton, Work	8415-00-268-8330
	Cloth, leather palm	8415-00-268-8350

ITEM			NSN*
		Leather, Welder, Gauntlet	8415-00-269-0432 (series)
		Leather, heavy	8415-00-268-7871 (series)
		Leather, Gauntlet, Linesman	8415-00-274-2432 (series)
		Cotton Knit, Fire Retardant	8415-00-024-9505
		Heat Protective Mitten	8415-01-092-0039
		Rubber, Electrical Insulating	8415-01-158-9445 through 9449
4.	Safety Clothing:	Butyl apron	8415-00-281-7813 through 7815
		Plastic apron	8415-00-715-0450
		Rubber apron	8415-00-082-6108
		Boot covers, butyl	8430-00-262-5295 through 5297
		Boot covers, disposable	8430-00-591-1359
		Coveralls, toxicological	8415-00-099-6962, 6968, 6970
		Coverall, white cloth	8405-00-082-5536 through 5539
		Coveralls, cotton (fire retardant)	8405-01-286-XXXX (series)
		Coveralls, Nomex (fire retardant)	4210-01-514-XXXX (series)
		Coveralls, anti-exposure	8415-01-531-XXXX (series)
		Coveralls, Catapult Crewman	8415-00-753-6346 (series)
		Coveralls, Cotton Sateen (Maintenance)	8405-00-131-6507 (series)
		Coveralls, Microwave Radiation Protection	8415-00-006-7770 (series)
		Coveralls, Arc Protection	8415-00-081-6481 (series)
		Footwear, Disposal Covers (used for OTTO II handling and with microwave protection coveralls)	0430-00-591-1359 (series)
		Coveralls, Explosive Handling	8415-00-280-2455 (series)
		Coveralls, Rocket Fuel Handlers Impermeable Full Protection	8415-00-725-3627 (series)
		Hood, Rocket Fuel Handlers, Impermeable	8415-00-753-6210

ITEM			NSN*
		Clothing, leather (for welders)	
		Sleeves	8415-00-164-0513
		Jacket	8415-00-268-8262 (series)
		Apron	8415-00-250-2531
		Jacket, cold weather	8415-01-495-XXXX (series)
5.	Personal Fall Protection Equipment:	Safety Harness Complete Assembly (work/safety lanyard)	4240-00-402-4514
		Safety Harness	4240-00-022-2522
		Safety Lanyard, ½"	
		Nylon Rope	NEW NSN TBD
		Safety Lanyard 1"	
		Strap Nylon	NEW NSN TBD
		Climber Safety Sleeve	4240-01-042-9688
6.	Personal Flotation Devices:	Life Preserver, Vest, Foam Pack (Inherently Buoyant)	4220-00-200-0538 (KAPOK)
		MIL-L-18045 TYPE I is being replaced with:	
		Life Preserver, Vest (Inherently Buoyant) (Stearns I600-ORG-NLT)	4220-01-485-1138
		Life Preserver MK1 Auto Inflatable Complete	4220-01-487-XXXX (series)
		Surface ships use AEL's 2-330014161 through 2-330014166	
		Submarines use the green color MK-1 only AEL 2-330013101	

*Also see Naval Ships Technical Manual, chapter 077, for additional information on personal protective equipment. _____

** National Stock Numbers (NSN) are subject to change. Recheck Numbers prior to ordering.

Appendix B12-B

PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT CHECKLIST

Indicate by an X, the answer to each of the questions below. If a question is not applicable to the command, indicate by NA in the YES block. Explain or describe the condition warranting any NO answer on the space provided at the end of the checklist or on additional sheets, if necessary.

The location of the NAVOSH Manual reference for any question is provided at the end of the question.

	YES	NO
RESPONSIBILITIES 1. Is there sufficient personal protective equipment (PPE) aboard the command? (B1202a)		
2. Is adequate funding provided to obtain or replace missing or worn out personal protective equipment? (B1202a)		
3. Does the safety officer, in conjunction with the master-at-arms force, monitor work stations to ensure that personal protective equipment is used for required work or in required spaces as well as being worn in a proper manner? (B1202b)		
4. Do division officers inform the supply officer of changes to the allowance of PPE so that COSALs, APLs, or AELs can be changed? (B1202c)		
5. Do division officers stock sufficient PPE to support the division's needs and issue it to personnel when required? (B1202c)		
6. Do division officers ensure that personal protective equipment is properly maintained? (B1202c)		
7. Does the MDR assist in obtaining/providing medically fitted PPE? (B1202d)		

PROTECTIVE EQUIPMENT		
8. Does the command ensure that metal hard hats are not used? (B1203a)		
9. Do all personnel above the damage control deck during condition 1 wear battle helmets?		
10. Do all enlisted hands possess standard stock safety shoes (issued at Recruit Training)? (B1203b)		
11. Are poromeric (i.e., CORFAM®) shoes prohibited except for departing or returning to the ship or when specifically authorized by the commanding officer for ceremonial purposes? (B1203b)		
12. Are deck personnel provided with leather gloves to protect against hand injury when handling sharp objects, wire rope, or banding material? (B1203c(1))		
13. When working with caustic or toxic materials, are personnel provided with gloves suitable for handling the material? (B1203c(3))		
14. Are insulated gloves (non-asbestos) available for personnel doing hot work? (B1203c(4))		
15. Is synthetic clothing such as certified Navy twill, prohibited in ship's fire rooms, main machinery spaces, and hot work areas? (B1203d)		
16. Are fire retardant coveralls provided to engineering personnel who stand watch or work in fire rooms or main machinery spaces? (C1302a(6))		
17. Are personnel working aloft or over the side provided with a safety harness and safety lanyard? (B1203e)		
18. Are wire rope lanyards used instead of nylon when doing hot work either aloft or over the side? (B1203e(1))		

19. Are safety harnesses, D-rings, and safety lanyards inspected in accordance with planned maintenance prior to each use? (B1203e(2))		
20. Are safety lanyards prohibited from being used for any other purpose than personal fall protection? (B1203e(4))		
21. Do personnel, other than air crew members and flight deck personnel who are required to wear life preservers in open sea operations, wear the life preservers? (B1203f)		
22. Do personnel wear MK-1 life preservers when in exposed battle stations, when working over the side, topside during heavy weather, in small boats and during towing and other evolutions when personnel can be carried over the side? (B1203f)		
STORAGE, MAINTENANCE AND INSPECTION OF PERSONAL PROTECTIVE EQUIPMENT		
23. Do divisions properly stow personal protective equipment? (B1202c)		
24. Check the PMS records for the personal protective equipment. Are maintenance and inspections being accomplished at the proper intervals? (B1202c)		
25. Are the hard hats being used by crew members free from cracks, holes, paint, or unauthorized modifications? (B1202a)		
TRAINING		
26. Do personnel, who are required to wear or use PPE in work, receive training prior to use and annually thereafter? (B1202c)		

CHAPTER B13

RESERVED (ERGONOMICS)

CHAPTER B14

RESERVED (FALL PROTECTION)